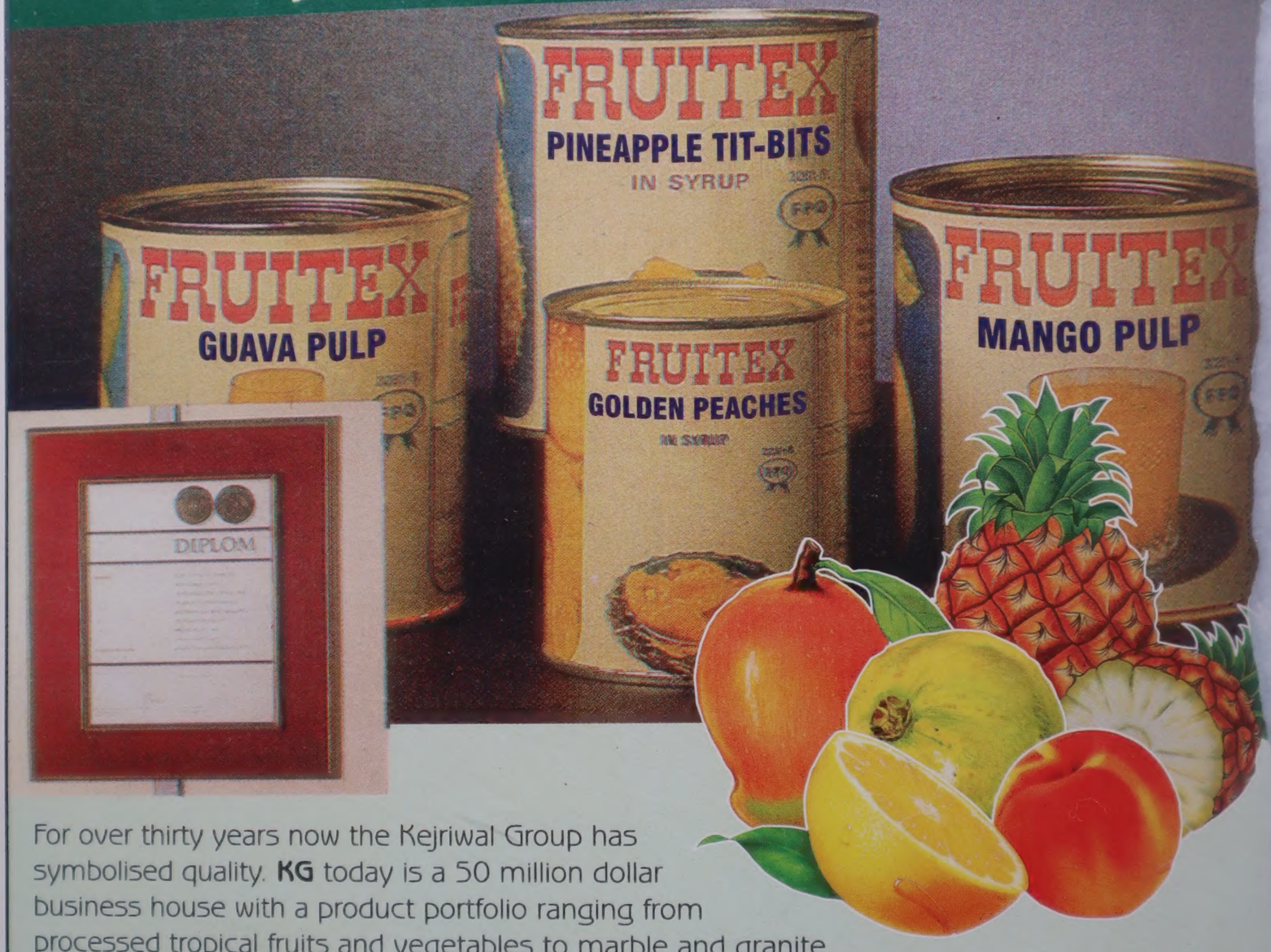
Indian Food packer

All India Food Processors' Association

VOL.55 JULY - AUGUST 2001 No.4

Kejriwal Group



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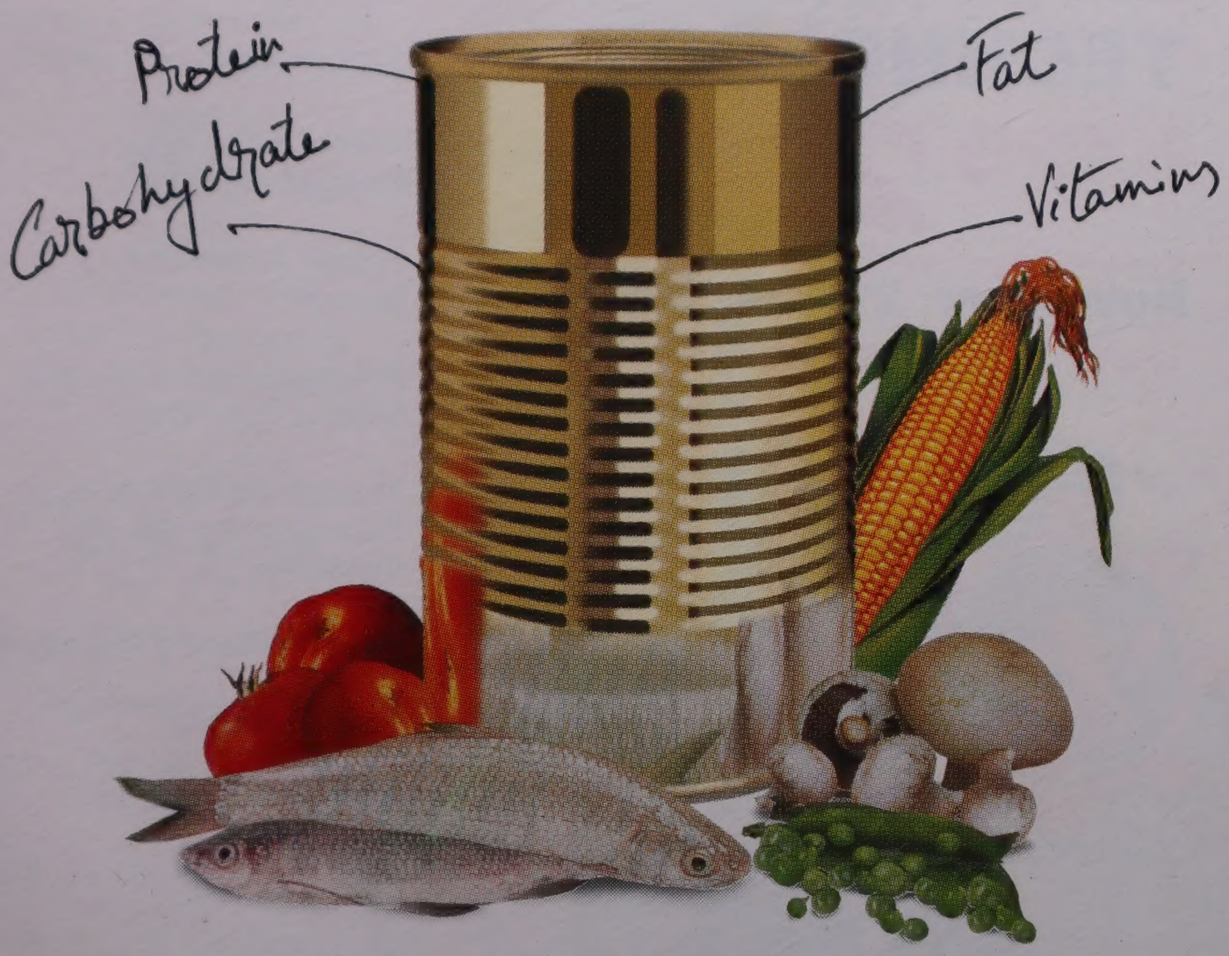

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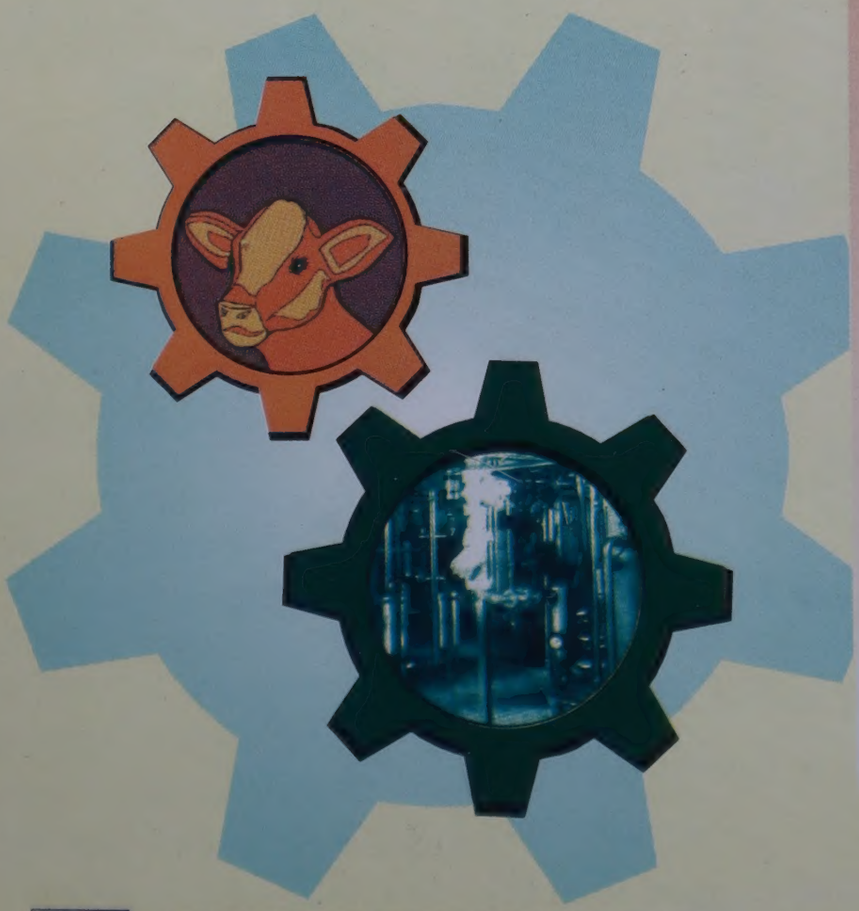

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Editorial

Whither Food Processing Industry ?

Food Processing Industry has been termed as a "Sun-rise industry" and several efforts have been made in the last few years to give a big thrust to this sector. The Govt. of India created a separate 'Ministry (now a Department) of Food Processing Industries" for this purpose in the nineties. Some of the State Governments also have created similar Ministries or Departments. With the liberalization of the economy in 1991 and globalisation, it was felt that Food Processing Industries would come up in a big way. Sadly enough, the hopes have been belied. During the post liberalisation period of 1991-2000, Foreign Direct Investment approved in Food Processing Sector was Rs. 834 billion through 698 collaborations, of which 137 were of technical nature and 561 were of financial nature.

India is a country of continental size with a population of over 1000 million, out of which 300-350 million live in urban areas. For the latter section, processed foods will become their main stay sooner or later. Global processed food business is said to be Rs. 16, 000 billion while India's contribution to this is a bare Rs. 1400 billion. What are the constraints for this dismal picture? The article on "Food for thought- is it digestible" by Dr. V.H.Potty reprinted in the following pages of this issue succinctly portrays the state of despair. Unless and until the infrastructure facilities improve, agricultural and horticultural productivity increases, modern post-harvest management of foods are followed and entrepreneurial skills are brought in, the hopes are dim. The article on "Food Processing Policy in India" by Sh. Omesh Saigal, former Secretary to the Union Department of Food Processing Industries which is also published in this issue shows a ray of hope. India is today the largest producer of fruits and vegetables with a total annual production of 130 million tonnes. Huge losses to the extent of 30 to 40% of the produce are reported due to lack of adequate infrastructure. Even though we have more than 5000 FPO licensed units in the country, hardly 2% of the produce is utilized for processing. Compared to this, Thailand processes 30%, Brazil 70%, Philippines 78% and Malaysia 83%. Even to increase the utilization of Fruits & Vegetables for processing from the present level of 2% to 10% in the next 10 years requires a huge investment of Rs. 1, 40,000 crores. Wherefrom and how will we get this investment? Domestic and Foreign direct investment can come only, repeat only, if there is a pragmatic and consistent national policy on development of Food Processing Industries in India. The proposed "National Food Processing Development Policy" now under the active consideration of the Government of India, if implemented in all its sincerity, could be the harbinger of a new era of food processing in India. Till then, we have to live on hopes.

— — — — —

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मॉडर्न
ब्रेड

25 सालों से माँ की पसन्द

INTERPUB/02/93

ASSOCIATION NEWS

MINUTES OF THE 1ST EXECUTIVE COMMITTEE MEETING HELD AT NEW DELHI ON 30TH MAY, 2001 AT 11.30 AM. IN THE CONFERENCE HALL, CONSULTANCY DEVELOPMENT CENTRE (CDC), ZONE IV B, IIND FLOOR, INDIA HABITAT CENTRE LODI ROAD, NEW DELHI.

Shri Gokul Patnaik, President presided over the meeting and welcomed the members.

The members who could not attend were granted leave of absence. (List of attendance is enclosed).

President reviewed the points taken up in TAC and North Zone Committee Meetings. In regard to PFA, he expressed the view that there was a need to correct PFA and update to meet the challenges of the changed environment.

President pointed out that there was need to rationalise Sales Tax Structure in the States. A meeting with Shri Asim Das Gupta, Finance Minister in the West Bengal Government who is the Chairman of the State Minister's Sales Tax advisory Committee may yield positive results. Sh. Vinod Thakkar was requested to arrange the meeting with Sh. Asim Das Gupta and during July we can meet the Minister and hold as well our Executive Committee Meeting at Kolkata.

2. Technical Standards of the Processed Food Stuff received from Directorate General of Supply & Tpt, Timarpur, Delhi vide letter No. 71697/Q/TSC/ST-8 dated March 2001.

It was decided that Shri P.P.S. Dhillon and Sh. B.L. Kapoor will finalise the replies and send our comments to DGFST.

3. Issues relating to Duty Drawback regulations.

President informed that the letter of Metal Containers Manufactures' Association dated 1st May 2001 is already circulated, However, it is expected from the members that they must send well in time the DBK-I, DBK-II, DBK-III duly completed to the Duty Drawback Department so that the drawback rates are fixed by them after careful consideration. This issue is faced every year and the industry is found wanting by the Duty Drawback Department.

4. Suggestions regarding F.P.O. Standards received from Sh. Vijay Shah, Chapter Chairman, Baroda.

It was decided that F.P.O. should continue to serve the need of the industry more effectively. Codex provision should not be adopted in F.P.O. All food laws should cover/ assist in improving the quality of food and concentrate on the following:

(a) Hygiene in manufacturing and distribution

(b) Consistency in manufacturing and keeping up quality.

(c) PFA should cover all foods not manufactured in a licensed factory from the point of view of health and fraudulent practices.

(d) Define punishment in PFA based on minor, small, medium, high and lethal, vidations.

The point raised in two letters dated 6th March, 2001 (enclosed) regarding FPO and Codex addressed to Joint Secretary, Department of Food Processing Industries were discussed.

5. Proposals regarding F.P.O. amendments aligning with codex.

Sh. R.L. Chopra raised the issue that adoption of codex provisions in FPO will be causing serious problems for the Indian industry in the domestic market. The members were of the unanimous view that F.P.O. should not adopt codex standards specifications for products.

This proposal was opposed by all. They were of the view that codex was optional in nature and through this process we will make this mandatory for the industry in the domestic market, which will make it very difficult for the SSI Sector.

6. New Membership list.

The list of new members enclosed was perused.

7. Any other item with permission of the Chairman.

(a) Sh. H.C. Lal pointed out that the assignment of Director F & VP in the Department of Food Processing Industries has not been handled by a Technical man for quite sometime. This is losing the direction. The consensus was that Director, F.P.O. should be a technically qualified person and this matter may be taken up with the Secretary, Food Processing Industries in a personal meeting.

(b) It was informed that Department of Food Processing Industries have appointed a working Group on Food Processing Industries Sector for 10th Plan (2002-03). In subgroups on Product Development, Food standards, promoting innovations & technology, President and Past President have been appointed as members.

(c) Website of Association

M/s Magnon Solutions Pvt. Ltd., New Delhi gave a presentation of the website developed by for them for our Association.

The members appreciated the need for a website.

President pointed out that the initial expenditure will be Rs. 30,000/- and facilities like free listing of the companies, Bulletin boards for Buyers and Sellers, Technical queries, Availability of Machinery and Raw Materials, Details of suppliers of packing materials and decision on PFA cases in various Courts etc. will be made available.

Details about the Employment Seekers (CVs) etc. and industry requirement of manpower can also be given.

Some of the activities will be nominally chargeable from the members.

Dr. S.K. Roy suggested that this should be the property of AIFPA and any service provided must be charged.

Meeting ended with thanks to the Chair.

The members were invited for lunch

Sd. (K.P. Sareen)
Executive Secretary.

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19.	M/S GRAINTEC INDIA LTD. V.P.O. BUDHEWAL, KOHARA, LUDHIANA, PUNJAB.	750.00	ORDINARY	NORTH	DR.JINDAL

MINUTES OF THE NORTH ZONE & TECHNICAL ADVISORY COMMITTEE MEETING HELD AT NEW DELHI ON 30TH MAY, 2001 AT 10.30 AM. IN THE CONFERENCE HALL, CONSULTANCY DEVELOPMENT CENTRE (CDC), ZONE IV B, IIND FLOOR, INDIA HABITAT CENTRE, LODI ROAD, NEW DELHI.

The Meeting was presided over by Shri P.P.S. Dhillon and he welcomed the members.

The list of the members who attended is enclosed. Those who could not attend were granted 'leave of absence'.

Initiating the discussion, Sh. P.P.S. Dhillon brought out the following issues:-

1. Minutes of the 30th Meeting of Food Additive Sub-Committee.

The members noted the points raised in the 30th meeting of the Food Additive Sub Committee of CCFS. It was brought out that in all decisions, the public perceptions should be addressed. There was a need to make PFA more pragmatics. The proposal to meet the Hon'ble Minister of Health & Family Welfare to apprise him of the Industry's view point for general policy guidelines was approved.

Participated :Sh. R.L.Chopra, Shri P.L.Kaul, Sh. P.P.S.Dhillon.

2. Notification No. GSR No. 202 (E) dated 21.03.2001 of (Ministry of Health & Family Welfare)- declaring Packaged Drinking Water as 'Food'.....Noted.

3. Notification No. GSR 245(E) dated 4th April, 2001 regarding package symbol of Non-Vegetarian Food.

In respect of the notification No. GSR 245(E) it was desired that the Ministry of Health may be approached for exempting outer packing of such goods from the purview of this notification.

4. GSR 165 (E) dated 7th March 2001 regarding foreign matter In food grains. .....Noted.

5. GSR 76 (E) dated 7th Feb 2001 regarding Sodium Bicarbonate In Canned Tomato Soup etc...Noted & Adopted.

6. GRS 67 (E) dated 5th Feb. 2001 regarding ATTA, Maida, Milk & cheese etc.....Noted.

7. GSR 876 (E) dated 20th Nov, 2000 regarding standards of Tin Containers for packing edible oils.....Noted.

8. GSR 877 (E) dated 20th Nov., 2000 regarding manufacturing & Import of Packaged Food.

9. Use of malic Acid in Food- Proposal received from ADG (PFA) vide letter dated 18th April, 2001.

It was felt that use of malic acid in food must be scientifically examined.

The Issues raised were;

(a) Imported food products must be covered under the PFA regulations.

(b) The Customs authorities must get the samples checked by Food Labs before clearing the consignments.

(c) Customs authorities should implement rules on M.R.P. expiry date and packaging requirements etc.

(d) Stickers should not be allowed. This is grossly misuses. In fact stickers on MPP is not allowed even by Indian Companies.

(e) F.P.O.should be mandatory for imported goods.

It was decided that PFA authorities may be addressed about the concern of the industry on the above issues.

Members were very much opposed to adoption of Codex Standards in F.P.O and make them mandatory since codex standards were optional and should not be forced on domestic market. The concern expressed was that PFA should ensure Food Safety and all other concerns like sanitation & hygiene, quality, purity etc. should be left to the F.P.O and other organizations concerned with food.

President joined for the Executive Committee Meeting and Shri P.P.S.Dhillon welcomed the President and requested him to preside over the Executive committee Meeting.

Sd/-
(K.P.Sareen)
Executive Secretary.

Smt. Vibha Puri Das, IAS
Joint Secretary,
Deptt. of Food Processing Industries,
Panchsheel Bhawan,
Khelgaon Marg,
New Delhi-110048.

Sub : MEETING OF CENTRAL FRUIT PRODUCTS ADVISORY COMMITTEE.

Dear Madam,

We take this occasion to refer to the discussions held in the Central Fruit Products Advisory Committee (CFPAC) meeting on 20th Feb. 2001 in your office regarding revision of FPO Standards . We would like to share with you herein the concerns & apprehensions which have emerged during our discussions with the industry in this regard.

A. CONCERN FOR THE IMPORTED PRODUCTS.

During the CFPAC meeting it was highlighted that an exercise has been undertaken to adopt details from the 'Codex' with a view to regulating the imported products entering the country under the liberalised import regime. In this respect we wish to submit that the imported products should carry the necessary labelling requirements (Name, Address of manufacturer & importer, MRP, Net Weight , Packaging date, Best Before date, Batch Number, Ingredients etc.) as applicable to Indian products . The imported product can be checked at the port of entry as per guidelines issued by the Govt to the concerned authorities at the port of entry.

B. ARE WE INTERPRETING HARMONIZATION CORRECTLY?

During the CFPAC meeting it was explained that the proposed draft of the new EPO standards has been prepared by the PFA authorities which they have suggested FPO to adopt, and it will be subsequently incorporated by them in the PFA. This process has been termed in the introduction to the draft paper as 'Harmonization'. We would like to express our deep concern & worry at this approach to standardisation. We are all aware that PFA & FPO have different functions to perform & their objectives are different. The FPO focuses on regulating the working of the industry, licensing, observance of hygienic conditions, good manufacturing practices & to provide basic product standards. On the other hand the focus of PFA is to ensure food safety & to check adulteration. In this context 'Harmonization' would mean 'Compatibility' & not 'Same'. Neither it is required to make them same. We strongly contend this misplaced concept on 'Harmonization' which we had explained in great detail during the discussions in the above CFPAC meeting on 20th Feb. 2001.

C. DOES FPO NEED REVISION?

As explained above, the FPO provides a wide base for innovation & product development. At the same time it gives a regualatory environment for hygienic conditions & promoting Good Manufacturing Practices. If there is nay instance of a new processing or packaging technology or a new product category which has not been covered by the EPO so far, the same can be done by adding an additional section to the FPO so far, the same can be done by adding an additional section to the FPO by way of an amendment notification as was done in May 1997. However, we do not feel it necessary to restructure the entire FPO at all. We may add that predefining by mandatory laws the various aspects such as shape, size, styling, cutting, sweeteners, salt or oil levels, shuts the scope for innovation & growth.

D. IS CODEX MANDATORY?

During the discussions in the above meeting it was mentioned by some officials that Codex standards are mandatory. We would like to clarify that Codex standards are not mandatory & each country formulates its own standards according to their requirement, agricultural & horticultural patterns, in frastructure system, climatic conditions, socio-economic requirement & technology inputs available. We feel that there should be no impression that the Codex standards are any better or more suitable. The contrary is in fact true in many respects.

In the perspective of the liberalized economic regime & the thurst Govt. has provided to Fruit & Vegetable Processing in the current Union Budget & looking at the vast potential which this segment posseses, we wish to suggest the following measures:-

1. The Govt. should issue guidelines for imported products

to bear necessary labeling requirements as per Indian laws and arrangement should be made for checking the products at the port of entry by the concerned authorities.

2. Dept. of FPI is requested to take up with the Ministry of Health for speeding up the process of removing current anamolies in areas of grading of violations and defining the clear testing procedures and restructuring of the rule for mutation systems.
3. There should be a 'Memorandum of Understanding' with the Ministry of Health for smooth working and implement negation of the law in respect of Fruit & Vegetable Products.
4. If any referral standards have to be developed for academic and R & D purposes, the same may be doen under BIS, wherein reference from Codex & other international standards may be explored & adopted.

We hope our above submission will receive your kind & serious consideration so that the vast growth potential of the Fruit & Vegetable Processing Industries is not restrained by rushing into any hurriedly adopted regulation.

With regards,
Yours sincerely,
(P.P.S. Dhillon)
Convener, Food Regulatary Committee

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LAUNCH OF AIFPA WEBSITE

Dear Members,

We take great pleasure in informing you about the launch of www.aifpa.com, the complete community site for the Food Processors of India. The web site is in the process of being developed to make it a one-stop-shop Food Processing Related portal and will be officially unveiled in June 2001.

AIFPA.com is being developed with a view to giving a new dimension to online Food Processors related information and services. Having spent years in fostering the Food Processors community, the Association recognizes the need to bring this community online and all the possibilities associated with this endeavor. The site is not only an online Directory and Information provider but is also a hub of various other services and information which would be available 24x7x365 being on the net.

At the Trade Related Zones of AIFPA. Com one would witness the initialization of online exchange of quotes (RFQ's), Auctions, Reverse Auctions and a host of other 'Business to Business' and 'Consumer to Business activities' through their interactive **Discussion Boards**. The objective of these Discussion Boards would be to create a common platform for enabling Institutions, Organizations and Individuals to interact and conduct business in a very profitable manner. The Trading Zone Discussion Board would enhance the area and scope of operation for every level, by leveraging the connectivity that the Internet provides.

What it has for the Your Organisation.....

1. Exposure to a huge market base giving tremendous boost to your business opportunities. Now, instead of working in a local market, your products and services will be available to a nationwide audience.
2. The site being registered with numerous Search Engines, would attract all the internet traffic of the Food Processors community. This would in turn be an opportunity for your organisation to be exposed to the ever-increasing e-markets.
3. AIFPA, as for the last 55 years, would be working towards the betterment of the Food Processors industry as a whole. Your Organization being an integral part of this Industry should be a part of this bandwagon. Similarly, a large number of similar players across the country would be made an integral part of the effort.
4. An opportunity to be a part of the strongest internet force for the Food Processing industry. AIFPA.com, with the speed it is growing, will not be ignorable

in a few months from now. Joining up at this juncture will draw maximum mileage for you and your business.

5. Share information online! AIFPA.com would enable all members to interact with the entire community of Food Processors through its highly interactive sections, thus enabling, information gaps to be shortened.
6. An unprecedented forum to interact and do business with people from your own industry. Use the reach and connectivity of the Internet to reach out to peers in the market and enhance your market presence.
7. Recognition among all the other members of the portal. This comprises not only others like you but also a long chain of your suppliers to your buyers.
8. A hyperlink on the site to your website, giving you an opportunity to share the entire traffic coming to AIFPA.com.

By now it may be clear that we through AIFPA. com are offering a host of opportunities to our early members. Joining hands with us now will guide you towards doing profitable business on the net, the way the world is doing today.

MEMBERSHIP PLANS-

Plan A-Basic Listing

All the members of AIFPA would be listed on the site for no cost. The following details would be included in the listing:

- Name of the Company
- Products
- Location (Head Office)

Plan -B Advanced Listings

Members would need to pay a sum of Rs. 500 (INR Five Hundred only) for getting an advanced listing on the site, which would include detailed information about the member including address, telephone numbers, names of contact persons over and above the basic listing. (See Annexure for Advance listing From)

Plan C- Web pages

Members would have an option of having web pages on the site AIFPA. com. These would be Second Level Domains (e.g. www.aifpa.com/xyzcompany). Members would have an option of putting in pictures as well as text under this plan. By exercising this option Members would be able to showcase their facilities and products by the way of the internet, which in turn would enable members to reach out to the entire world.

These pages, shall be generated by a proficient team Designers and Web Developers of Magnon Solutions Pvt. The Delhi based internet Company, which has worked for over a 100 Clients across North India would develop these pages at their State of the Art Development Center in Lajpat Nagar, New Delhi. This team, chosen by Mc Kinsey India Ventures 2000, has one of the best Internet Development teams in the country and would be offering their services at a Concessional Rate. The charges for this plan would be Rs. 500 (INR Five Hundred Only) per Web Page, which would include costs of designing, developing and hosting the web pages.

Email ID's

Members of AIFPA would be entitled to Email Id's, which they could use for their official purposes. These Email Id's would have the suffix of AIFPA. (e.g. suresh@aifpa.com

An amount of Rs.250 (INR Two Hundred Fifty Only) would be charged for creating each Email ID.

While we expect your immediate response, we shall await your feedback latest by 31st August 2001.

Immediate action on the issue would be appreciated. All amounts would be payable to All India Food Processors Association.

Thanking you,

Yours faithfully,
Gokul Patnaik
President

ANNEXURE

Advanced Listing -Form

- Name of the Company
- Name of the Chairman/MD/ECO
- Contact Person(s)
- Address
  - Office (Head and Branch Offices)
  - Factory (s)
- Telephone Numbers
- Fax Numbers
- Email Id's
- Products Manufactured
- Date and Year of Establishment
- Markets Covered:
  - Indian
  - Foreign
- Details of Plant and Machinery in brief
- Annual Turnover (Optional)
- Any other information which may be considered necessary for Business Promotion.

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NEWS ROUNDUP

A Profile of the Indian Market : Exports and Imports

Even though India remains a net agricultural exporter and is usually self-sufficient or a surplus producer of foodgrains, inadequate incomes leave millions malnourished.

India's exports of agricultural products were valued at $ 6.77 billion in 1998/1999. Leading exports were marine products, cashew nuts, rice, oilseed meals, coffee and tea. India's share in world agricultural trade is less than 1 percent.

Indian enjoys the unique distinction of being the single largest producer, consumer and exporter of spices in the world as well as the leading producer and exporter of cashews in the world.

India's agricultural exports to the United States are 10 times greater than U.S. agriculture exports to India ($100 million).

India's total agricultural imports were valued at $3.25 billion in 1998/ 99. Leading imports were vegetable oils, pulses, raw cashew nuts and wood and wood products.

India is the world's largest importer of vegetable oil and pulses. Because of India's restrictive trade polices, agricultural imports are small compared with the size of the domestic market. For food security purposes, the government occasionally imports significant quantities of wheat, particularly in the years of adverse domestic supply.

Ag Exporter *March 2001*

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Codex near consensus on Biotech Food Norms

The joint FAO-WHO Codex Alimentarius Commission's ad hoc inter-governmental task force has made significant progress in setting standards for foods derived from biotechnology. Codex Alimentarius is the body responsible for the development of international standards for food safety and consumer protection.

The task force, bringing together officials from 35 countries and representatives of 24 non-governmental organisations including Consumer International, Industry Groups and Greenpeace reached near consensus on a draft text of 'General principles for risk analysis of foods derived from biotechnology'.

Risk analysis is the system by which governments consider the safety of foods and the measures that need to be taken to protect the public from any health risks. The guidelines do not cover environmental issues because these are included in other-United Nations agreements, such as the Cartagena Protocol on bio-safety.

The one point on which consensus could not be achieved was the question of traceability. This is a system of tracing all food and food components from their origin to the point of final consumption and is not related exclusively to foods derived from biotechnology. Traceability is strongly favoured by European countries, but some countries worry that the system might be too complex and too costly to operate globally.

The task force also announced agreement on the draft guidelines for the conduct of safety assessment of foods derived from recombinant-DNA plants. The guidelines pay special attention to allergenicity that might be transferred to new genetically modified plant varieties. The guidelines also prohibit the transfer of genes that would cause gluten-sensitive reactions in people with celiac disease. The task force will further refine guidelines at its next meeting and will initiate work on similar guidelines for the safety assessment of genetically modified micro organisms used in food production and processing, a FAO release said.

Processed Food Industry *April 2001*

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Food Imports must meet PFA Norms

The Exim Policy has made it clear that all imported edible/food products would have to meet the conditions of the Prevention of Food Adulteration Act, 1954 which is currently applicable to products that are manufactured and sold domestically.

"Import of all these products will have to comply with the quality and packaging requirements as laid down in the Act. Compliance with these conditions is to be ensured before allowing customs clearance of the consignment", a Commerce Ministry notification, amending the ITC (HS) Classification of Export and Import Items, 1997-2002, has said.

What does this mean for importers of food products? What are the 'conditions' under the PFA that would have to be necessarily complied with? To get a basic idea, one may list a few important Rules under the PFA.

Rule 32, dealing with Essential Labelling, requires all packaged foods to bear (1) name and complete address of the manufacturer, packer, vendor and importer, (2) name and trade name of the product, (3) name of the ingredients in the descending order of composition, (4) net weight or volume, (5) distinctive batch number or lot number, (5)month and year of packing, (6) declaration in capital letters on the month and year up to which the product is best for consumption (7) for packages of all types of milk, bread, dhokla, bhelpuri, pizza, doughnuts, khoa, panner and uncanned packages of fruits, vegetables, meat, fish, etc, it is mandatory to print the 'best before date' along with month and year.

Rule 37C mandates proper labelling of irradiated foods, with Rules 73-78 specifying the foods, items for which irradiation is allowed along with prescribed doses of radiation.

Rule 23 prohibits addition of unauthorised colouring maters in any food article. Where an extraneous colouring matter, natural or synthetic, is added, a statement 'contains permitted natural and synthetic colour' in capital letters would have to be displayed just beneath the ingredients on the label.

Rule 27 prohibits addition of all inorganic matters and pigments, except titanium dioxide in chewing gum. Rules 26 and 27 give the list of permissible natural and synthetic colours, with Rules 29 and 31 defining restrictions and limits on use of synthetic colours.

Rule 63 defines and lists the use of permitted natural and artificial flavouring substances in different food products, with Rules 52-56, 59,60 and 61 giving the list of permitted preservatives, antioxidants, emulsifying and stabilising agents, along with restrictions of their use. Again, use of extraneous flavouring agents would require the declaration 'contains added flavour ' on the lable.

Apart from the specific Rules , the PFA Act also provides for sampling, inspection and confiscation of food items, along with prescribed penalties. Thus, under Section 6(2), the Customs collector or any officer authorised by the Central Government can detain any imported package and report such detention forthwith to the Director of the Central Food Laboratory (CFI.). If required, he may forward the package or send samples of any suspected article, of food therein to the said laboratory.

Further, under Clause 10(2) of the Act an authorised food inspector can enter and inspect any place where the food article is 'stored for sale' (warehouse) or 'exposed for sale' (distributor's or retailer's premises) and take samples of these for analysis to check conformation of PFA standards.

Processed Food Industry April 2001

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I.I.T. Kharagpur to promote agro based industries

After nurturing anchor IT companies, Science & Technology Entrepreneurs Park (STEP) of Indian Institute of Technology, Kharagpur (IIT-KGP), has decided to focus and promote agro based industries and biotechnology companies.

According to Prof. Nori Prakasa Rao, Managing Director of STEP, the focus on agribusiness and biotechnology has been prompted by "the resources we have in and around the IIT campus here" Besides having access to the vast pool of intellectual capital at IIT, STEP owns 101 acres of land at Gopali near Kharagpur.

Prof. Rao said that a total of 17 entrepreneurs had set up operations at STEP. Of this, seven were IT companies with the rest being engaged in agriculture and biotechnology. The total turnover of these companies exclusively from STEP operations is estimated to be in excess of Rs 50 lakh during the year ending March 31, 2001. Already, several small entrepreneurs have scripted their own success stories here. These include an insect repellent unit and a vermicompostplant.

On its part, STEP has set up a model tea plantation with help from Goodricke Group which has supplied 20,000 saplings free of cost. The idea now was to set up a processing plant before local farmers could be persuaded to embark upon tea cultivation. Land in the region is stated to be suitable for production of orthodox and CTC varieties of teas.

Frocessed Food Industry April 2001

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Iran, Iraq, China and Russia turn to India for sourcing meat

The wide-spread food and mouth disease (FMD) in European countries has resulted in many meat consuming countries like Iran, Russia, Iraq, Indonesia and China-considering India as an alternative market, since in India the outbreak of the disease is reported to be confined to certain states.

It is hoped that India's export figure may remain unsheathed notwithstanding the ban from Egypt and Saudi Arabia.

"Iran has already stepped up its meat imports from India over the last one month. In February, Iran imported around 2,000 tonnes of buffalo meat, against a monthly average of 200 tonnes last year," said Mr. Irfan Allana, chairman of Frigorifico Allana and president of All India Meat & Livestock Exporters Association.

"Of the 117 meat importing countries, 90 countries, at the last count, have banned meat imports from Europe, the latest to announce ban on European meat being Singapore and Taiwan. The entire scenario is now shifting in favour of India's exports," said Mr. Allana.

Major importers of meat are Australia, New Zerland, EU, the US, Canada, Argentina and Brazil. India's share in the international meat trade is a mearge two per cent.

Mumbai-based meat exporters claimed that the recent bans and suspensions are temporary, and India's buyers are in the middle of reviewing their bans.

"A large majority of Indian exports (around 97 per cent) are deboned, de-glanded bone-less buffalo meat. The meat in India, which has a low value of below six and is frozen under minus 40 deg Cel, is a most risk-free stuff since no FMD virus can survive in these conditions," said an exporter.

"The West Asian countries cannot sustain without Indian meat, and its one month ban is likely to be lifted-shortly," claimed another exporter, adding that he is already packing his consignments to Cairo in anticipation of the ban removal.

The exporters claimed that the Indian meat exports are international quality standards, and in the past had never been rejected at the destination port on account of poor quality or health reasons.

Processed Food Industry April 2001

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Policy paves way for meat, poultry items imports

The removal of quantitative restriction may result in the import of lamb meat and poultry products, industry sources said.

Currently, imports of meat and poultry products are negligible, mainly for the diplomatic missions and five star hotels, Mr. Irfan Allana, President , All India Meat & Livestock Exporters Association (AIMLEA), said.

The Exim Policy has stated that import of meat and poultry products will be subject to compliance of all the provisions of Meat Food Product order (MPFO).

According to Mr. Allana, the provisions of MPFO under the Directorate of Marketing and Inspection within the Ministry of Agriculture are in line with normal international standards.

Indian exports deboned and deglanded buffalo meat while sheep meat and poultry products are mainly used for domestic consumption.

Exports are expected to increase to 250,000 tonne for the

fiscal year 2001-02, against 165,000 tonne exported this year, according to AIMLEA, Exports of deboned meat are expected to cross Rs. 1200 crore next year, India also exports chilled sheep meat mainly to West Asia.

However, the true impact of imports will be known later, Mr. Allana said.

Processed Food Industry April 2001.

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81 per cent of imported food products violate food laws: study

A study sponsored by the ministry of agriculture and department of food processing industries and conducted by a consumer rights organisation, Voluntary Organisation in Interest of Consumer Education (VOICE), indicates gross violation of food laws in several imported baked beans, sausages, tinned tuna, choco, pie and apple paste etc.

According to the study, from the 457 products from 60 countries, 81 per cent of the food samples that were examined violated rule 32 of the Prevention of Food Adulteration Act.

Twenty - five per cent of the samples did not mention the manufacturing and expiry dates, Twenty-two per cent of the samples did not give a separate declaration on the package about use of flavours, colours and vegetable fats, as required under the provisions of law.

And 64 per cent of the imported products did not carry the maximum retail price, which is compulsory as per the Standards of Weights and Measures Rules, 1977. This is again the responsibility of the importers as per the provisions of law.

The country of origin was not mentioned on 12 products and 10 food samples did not carry English translation on them.

The food samples were examined in four categories: confectioneries, beverages, meat and value added food products like noodles, pasta, macaroni, spices and soup powder. The report states, "The ministries of agriculture, consumer affairs, health and family welfare, commerce and finance, should constitute a task force to regularly review and co-ordinate effective monitoring of food products and its imports.'

The reports highlight the "helplessness of consumers" in the absence of infrastructure to process complaints and prompt redress. The government should make it mandatory for all importers to give an undertaking that at the time of import, the commodities would comply with the provisions of the Packaged commodity Rules (1977).

Processed Food Industry April 2001

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Belarus offers Haryana expertise in food Processing

Belarus has offered Haryana its expertise in agriculture and food processing and for the manufacture of scientific equipment.

Mr. A. K. Kharlap, industry minister of Belarus, who called on Haryana Chief Minister Mr. OP Chautaia along with a 12 member business team, said a special training programme in engineering for the youth of Haryana would be introduced in Belarus and a separate faculty would also be set up for Indian students, says an official release.

Processed Food Industry April 2001

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Food processing industry to get tax exemption

Trying to give a further push to the food processing industry, the Union government has now asked state governments to consider sales and trade tax exemptions.

This comes on the heels of the finance minister's announcement, during the budget presentation, that the government would not levy excise duty on processing industries based on fruit and vegetable preparations. And, it said, it would give incentives for industrial parks, including food parks.

The latest request from Union agriculture minister Mr. Nitish Kumar to states is an attempt to rationalise the entire duty structure. Sales and trade tax account for about 12 per cent of the burden on the industry, yet collections are nornonal exemptions, says Mr. Kumar, could spur investments running into thousands of crores in a state.

Food processing in now a priority attention area for this government, the target being to increase processing levels from the present woeful two per cent to at least ten per cent in ten years.

The steps now recommended would not just create the essential enabling environment but ensure an investment of Rs 140,000 crore in the entire food chain. Such resource mobilisation will be needed if farmers are to get remunerative prices.

Processed Food Industry *April 2001*

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Fruits, Meat, Rice, Wheat on import watch list

Rice, wheat, liquor, tea, coffee, sugar, fruits, including apples and grapes, poultry meat and dairy products have been put on the watch list of 300 sensitive items whose imports will be monitored by a war room.

Unveiling the 2001-02 Exim Policy, Commerce and Industry Minister Mr. Murasoli Maran had announced that the war room manned by a Standing Group of senior officials would keep a close watch on the import trends on these items and publish a monthly statement for the media.

The step was aimed at checking any surge in imports of these items to the detriment of the local products. The ministry had decided on this as a precautionary measure.

Processed Food Industry *April 2001.*

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'Biotechnology can boost fruit exports'

"Biotechnology can help India to become one of the world's largest exporters in commodities with a major thrust into the genetically modified seed market", said Professor Peter J.Coloe who was here to address a seminar on the scope of biotechnology organised by RMIT Helpdesk today.

Talking to the Tribune about the opportunities in biotechnology with special reference to India, Prof. Coloe said although India was second largest producer of fruits and vegetables in the world, but it accounts for only I per cent of exports because of deficiency in post-harvest technology and the absence of effective bacterial and fungal spoilage control.

"Only the application of new biotechnology technique will rapidly resolve some to these deficiencies and could make India become one of the world's largest fruit and vegetable exporters" he added.

Mr Coloe who is working as Biotechnology Professor and Head of RMIT Biotechnology and Environmental Biology in Australia predicted that the biotechnology would soon be the thrust area in view of its vast application in all spheres and the current growth.

He disclosed that biotech business is increasing exponentially with major thrust into human health, agriculture, veterinary medicine and environmental biotechnology.

There was an urgent need for new biotech-based vaccines for cancer, diarrhoeal disease, influenza virus. TB, Malaria and pneumonia and a need for improved and cheap disease diagnostic.

He said situation was similar in many countries that proves the opportunities had arrived but the new thrust would be biotechnology and he has coined a new slogan from IT to BT that is information technology to biotechnology.

Prof Coloe said the biotechnology had direct impact on several activities such as health care, agriculture, food processing and horticulture.

Tribune *6 May 2001*

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DRDO develops ready-to-eat rotis, pulav for defence personnel

Keeping in view the strategic operational requirements of the country's defence forces, the Defence Research Development Organisation (DRDO) has come up with ready - to -eat, quick-cooking and instant food, a top scientist has said.

"By making use of innovative state-of the -art food processing technologies, DRDO has developed ready - to -eat chappaties with a shelf life of six months, instant pulav-mix which can be consumed even after a year, fruit juice powers and a host of other such products," Life Sciences Research Board secretary Brahma Singh said.

He said through a technique called 'minimal processing' a variety of vegetables could be made available in trimmed and cut form.

Permissible additives and preservatives derived from organic sources would be used to retain the freshness of products for a longer period, Singh said.

The minimally processed vegetables were safe, besides being rich in ascorbic acid, he said, adding that such products had a shelf-life of 14 to 28 days under room temperature.

Singh said flexible packaging materials such as low-density polyethylene (LDPE) when impregnated with potassium permanganate and cinnamic acid, get rid of ethylene a gas which hastens spoiling.

"Fresh fruit and vegetables exhibit greater shelf-life of two to three weeks when packed in such ethylene-scavenging film; besides, the incorporation of ethylene - scavengers considerably improves certain properties of the packaging material," he added.

The technology had been perfected in the laboratory and large scale production of such "active" packaging material was under way, Singh informed.

Another innovative technique freeze thaw dehydration - of processing instant pulses, whole legumes and cereals had been developed and standardised, aiming to make them ready - to -eat in less than eight minutes, by merely mixing in hot water, he said.

This technology was put to use by DRDO to prepare 6.25 tonnes of instant "khichidi" for supply to Gujarat earthquake victims, he said.

"DRDO has also taken up design and development of foods for space, mountaineering and Antarctic expeditions."Singh elaborated.

Times of India *8 May 2001*

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Juices threaten to take fizz out of aerated drinks

This threat of imported fruit based juices notwithstanding, this summer, carbonated soft drinks are having to contend with fruit-based thirst-quenchers taking a slice out of the total market of parched throats.

Retailers admit that consumers are increasingly reaching out for fruit-based drinks and non-carbonated soft drinks, some times even at the expense of a cola or any other brand of carbonated soft drink (CSD).

Though juices make up only five per cent of the estimated Rs 5,300 crore soft drink segment, choices in this category are plentiful. They include Real from Dabur, Tropicana from the Pepsi stable and Frooti, the much hyped Digen Verma's chosen drink from Parle Agro. Also, in the non-CSD segment, there is Maaza from Coca Cola India (CCI) and Slice, from Pepsi Foods Ltd.

Dabur has seen a growth of between 35 and 40 per cent in its Real brand of fruit juices, a company official told 'Business Line'. And while growth percentages of the sort are a tough act to follow, the juices category had seen similar growth last year too. Real, recently relaunched in a contemporary pack, currently exists in five flavours orange, mango, pineapple, mixed fruit and tomato.

"Growth in juices category has always been higher, Maaza, for instance, had seen a whopping growth of 70 per cent in 2000, over its comparative figure in the previous year," according to CCI's spokesperson. "And while the total soft drink segment grew at about eight per cent last year, Maaza grew at 14 per cent,' he adds.

Similarly, while CCI saw a 12 per cent growth accross its basket of thirst-quenchers in the first quarter, Maaza alone clocked a growth of 45 per cent, he said.

"Growth in the juices segment is not at the expense of the colas or other carbonated soft drinks. Though it is true that more people are going in for the fruit based products, there is little cannibalisation taking place. It is just that the total market is expanding. A market like India, with per capita consumption as low as six bottles, offers a huge potential to expand," he adds. Quite understandably, Maaza plans to launch two more flavours by the end of this month.

Retailers observe that consumers are increasingly taking to fruit-based drinks "because of a perceived image of them being good for health".

Not surprisingly, Tropicana has aggressively positioned it self on the health platform. However, it has had to contend with the price barrier of a 1 litre Tropicana vis-à-vis a CSD of similar capacity. The juice was recently launched in 200 ml cartons to make it more competitive on the price front, even as it grapples with the logistics of proper handling at the retail level. Despite this, Tropicana has shown satisfactory growth, company officials say.

Natuarally, Tropicana Beverages Co. plans to add more to its existing portfolio comprising orange, apple, sweet orange, pineapple and grape. Two new flavors tomato and mixed fruit, are slated for launch later this year.

Business Line *8 May 2001*

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Cifti working on reinvigorating foodpark concept

Despite the dismal failure of the food park concept, Ficci and its sister organisation, Confederation of Indian Food Trade and Industry (Cifti), is working closely with the ministry of food processing to reinvigorate the theme.

Parna Dasgupta, secretary, Cifti, told 'Business Standard' that the focus of the effort is to professionalise small and medium food processing companies and enable them to reduce supply chain overhead costs, "The ministry of food processing has planned an infrastructure of 30 food parks and this network will help in increasing the turnover of the industry," she added.

The turnover of the food processing industry is $20 billion, thought it was expected to grow to $60 billion by 2001, Dasgupta stated.

Business Standard *9th May 2001*

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Egypt urged to lift ban on Indian meat

After winning a major victory with Jordan over meat exports, India is now urging Egypt to rollback ban on meat imports from the country. A high-level delegation, headed by Anil Swaroop, chairman of Agricultural and Processed Food Products Export Development Authority (APEDA), had been to the east African nation to win back the high potential export market.

Egypt and Jordan had banned meat products from India in the wake of the Foot and Mouth Disease (FMD) found in animals.

"Egypt is a very potential market for India in regard to meat exports and we have urged the Egyptian government to lift its ban on meat imports from the country," Swaroop told 'Business Standard'.

The importance of Egypt as an export market can be gauged from the fact that meat exports to the country has grown manifold in just one year. While earning from it stood at Rs 64 lakh in April-December 1999, it was Rs 12,382 lakh during the same period of 2000.

Exports to Jordan on the other hand increased to Rs 42.95 crore in April-December 2000 from Rs 17.95 crore in the same period of the previous year.

Moreover, since the Middle East and East African nations are major meat eaters, the recent ban on European meat due to the FMD and the mad cow disease has opened up immense export opportunities for India, the chairman said.

Considering the potential, the commerce ministry too sent a delegation just after the countries imposed the ban.

Business Standard *11 May 2001.*

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Govt plans 100 pc FDI for food processing units

The Centre is considering 100 per cent FDI for food processing units, apart from arrangements of loans and lower sales tax on these units.

Mr D P Tripathy, Secretary, Food Processing, said while speaking at a session on 'Food Processing Industry: Challenges and Opportunity" organised by the CII and the Punjab Agro Industries Corporation here today.

The challenges of the WTO have to be converted into opportunities by the food processing sector to access the Global market, he said

The need, at present, is to focus more on the domestic market since this is the area which the foreign companies are also eyeing at "Once we are able to create a niche in the domestic market, facing global competition would not be tough", said he.

Conceding that the industry is facing challenges in terms of infrastructure, taxes, high interest rates, weak marketing and absence of crop insurance schemes, he observed that initiatives were being taken by the government.

Mr. Jagjit Singh Ghungrana, Chairman, PAIC, cautioned that farmers and traders would suffer if they are not able to bring themselves at par with the national standards within four years.

He said venture into the food processing industry today is very

costly and the government needs to take several initiatives both at the Central as well as the state level.

"While the industry has been always protected, agriculture has still not been able to come out of the wheat - paddy cycle syndrome", he said.

Speaking on the policy initiatives in Punjab, Mr A R Talwar, Managing Director, PAIC, outlined the state's unique food park models which covered all stages of the food processing chain right from special nurseries to market outlets.

With 1,000 farmers registered for contract farming and sattelite units, such a park is shortly coming up in Fatehgarh Sahib, followed by Amritsar and Bathinda districts.

Of the estimated cost of Rs 18 crore, the Centre had sanctioned Rs 4 crore while the state has sanctioned Rs 10 crore, he said.

Other policy initiatives included establishment of horticulture estates, agriculture export zones, service facilities, pre-cooling and outlays ranging from packaging to air fre ight.

He also said 10 other projects are in outline involving a total outlay of Rs 200 crore.

Mr. N.A. Brat, Additional Managing Director, PAIC, highlighted the initiative being taken by the government to promote the industry. The state government is offering land for agro-based R & D units.

The state has two projects- frozen vegetables and tomato processing and six units for cooling. Vegetables like coreless carrots, okra, broccoli have been identified for export.

Describing the PepsiCo's experience in contract farming, Mr Abhiram Seth, Executive Director, Exports, of the company said the tomato initiative had resulted in three-fold increase in the yield.

A lender's perspective was provided by Mr Sumit Gupta, Senior Manager, Rabo India Finance. The new success factors in the current scenario are sensitivity of global conditions, environment concerns, value chain linkages, economies of scale and human resource deployment, he said.

He listed the key risk factors ailing this industry. Dr Alok Kumar of Proagro-PGS India spoke on how biotechnology could help increasing productivity of crops and its application in food processing.

Mr C.L.Bains, Financial Commissioner and Secretary Agriculture, Government of India was also present.

Tribune *19 May 2001*

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Processed Food Development Act - A perfect blend of sorts

Even as the bogey of foreign food products flocking the Indian market casts its shadow over domestic entrepreneurs, the proposed Processed Food Development Act seeks to bolster domestic entrepreneurship by axing 14-odd regulations that shackle the segment.

Food processing industry sources told Business Line that the proposed Act chalks out a developmental role, as opposed to a regulatory one and "will render infructuous other regulations that come under the purview of food processing".

Domestic industry representatives observe that the lifting of QRs, from April 1, makes it all the more imperative for an umbrella Act, to spur growth in the segment. "The cabinet note to this effect is ready," sources said.

Regulations relating to food will not be scrapped in their entirety . Only the core elements of the existing food laws, relevant in the present day context, will be incorporated into the umbrella Act, the source clarified.

Regulations likely to be rationalized include :the Prevention of Food Adulteration Act 1954 and Rules, Standards of Weights and Measures Act and Packaged Commodity Rules, Essential Commodities Act and orders (namely Fruit Product Order, Milk and Milk Products Order, Meat Products Order, Solvent Extracted Oil, De-oiled Meal, Edible Flour Control Order), Indian Seeds Act, the Copra Cess Act, the Produce Cess Act, MRTP Act, Consumer Protection Act, the General Excise & Customs Act, Agricultural Produce (Grading & Marketing) Act, Export (Quality Control & Inspection)Act, Environment Protection Act and other Central /State/Local bodies Acts having a bearing on the food processing segment.

Food processing circles point out that a single all encompassing regulation was needed to avoid the multiplicity of laws and multifarious agencies administering them. "A number of laws pervade this industry, both specific and indirect ones. These regulations are oblivious to the developments in science, food-micro-biology, food -chemistry, food-technology and trade developments. The segment needs rationalization and simplification of food laws and a single window clearance mechanism."

Industry representatives pointed out that issues as micronutrients and food-fortification, import of new technologies as genetically modified foods, export regulations, standards, merit goods, taxations etc should be covered.

The proposed Act seeks to move away from the regulatory penal regime to a promotional and developmental mechanism to help the domestic food industry to become more viable. It will also take into account the sanitary and phyto-sanitary requirements, as per international standards.

Defining standards will be drawn up to cover nationally manufactured goods and imports and will consider provisions as Agmark, Export (Quality Control & Inspection) Act, ISO -9000 and SQS-2000 besides Codex standards.

"Standards will be made mandatory rather than voluntary. The Act also envisaged an authority to monitor compliance and guide industry. It would define merit goods and bestow higher incentives to more value-added products. Provisions for a Food Development Fund to enable access to investible funds and an Equalization Fund to cushion price fluctuations are also envisage," the source said.

In line with the Environment Ministry's notification on the use, import and export of genetically modified foods, the proposed Act is also expected to have provisions to regulate such foods, they said.

Business Line *19 May 2001*

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FMCG imports war begins in small town India

Recent trade statistics have been suggesting that foreign goods are nowhere near swamping the Indian market, but a new research report bolsters Indian industry's case that imports are, indeed, a real threat.

Based on discussions with six importers of foreign goods, the report by brokerage house SG Asia says that a host of imported consumer goods such as coffee, soap, toiletries, yoghurt and juices are finding their way into small town India priced on par with or marginally higher than Indian goods, despite the hefty import duty of over 70 per cent.

For example, Super Mix, a coffee brand, is imported from Indonesia by Ameya Trading. The price tag on a 200gm pack is Rs 185, the same as on a Nestle pack. But buyers of Super Mix also get a mug worth Rs 10 free, plus a discount coupon of Rs 5 for subsequent purchases.

To cite another example, Lux is being imported from Indonesia and is sold at Rs 6-9, wholesale. Add on a 20 per cent margin for retailers and the retail price is still perhaps lower than or equal to the Rs 10-15 Hindustan Lever retails an average 75 gm soap for Brands like Lux are familiar to Indian consumers and Hindustan Lever could, in the long run, bear the brunt of the onslaught of imported soaps.

Indeed, most imported products could have huge turnovers. Ameya Trading, the report says, is aiming at a turnover of Rs 120 crore in the next 2-3 years.

According to the report, an organized set of importers has sprung up, unlike six months ago when traders imported a couple of containers of goods and hawked them in the smuggled goods market. The new importers have tied up with international companies and are setting up their own distribution net works.

The report explodes several myths. First, that the market for foreign goods is not confined to premium metro outlets. Foreign goods are finding takers in small town India also. Organised importers already have a presence in six or seven states. The ones in Mumbai have made big inroads into samller towns in Gujarat and Maharashtra, while those in Delhi are eying Punjab and Haryana.

Analysts who track the fast moving consumer goods sector said: "This is because the novelty factor of buying imported products still exists in smaller towns."

Secondly, the common perception that high duties will put imports out of the reach of most Indian pockets is patently incorrect.

Importers are able to price foreign goods competitively, because Indian companies are grossly over charging customers and making hefty margins, the report argues.

It goes on to state that importers have direct arrangements with foreign manufacturers - these are not usually multinationals that have subsidiaries here because MNCs won't want sales of local arms to be hit-which sell products to Indian importers at a lower price. Importers have low overheads and don't advertise imported products either offering instead higher trade margins to retailers to push their products.

The P&G management has admitted to SG Asia researchers that the company can import Camay soaps at Rs 5, the report says. However, P &G can sell one or two cartons at the same price, but selling more than this would entail higher distribution costs (12 per cent of overall costs).

But companies Business Standard contacted said they don't perceive a threat from imported goods, Sources at Nestle India said that sales would not be affected as its brands are well established in the market.

And Hindustan Lever officials argued that importers can only sell small stock keeping units (SKUs) in the rural market, as sales would depend on the repurchasing power of consumers. They can never reach the mass market, Lever executives confidently asserted.

Business Standard *21 May 2001*

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18 states identified for attracting investment in food processing units

The agriculture ministry in its recent study has identified 18 states for attracting investments in the food processing sector.

The study expects a total investment of Rs 1.40 lakh core within a span of 10 years. Maharashtra can attract an investment of Rs 22,786.40 crore, followed by Rs 17,645.60 crore investment in Tamil Nadu and Rs 15,451.80 crore in West Bengal, Rs 6,529.60 croe in Punjab and Rs 2,153.20 crore in Haryana.

The ministry on the basis of survery has advised the states to support the Centre's decision to grant 10 year tax holiday to the industry by giving similar matching relief by withdrawing sales tax and other local taxes on processed foods. This would help the processed food to be cheaper by at least 40 per cent for catering to the needs of the common man. This will eventually enlarge the market size of processed foods in the country.

The study stated that with the expected size able investment of Rs. 1,40,000 crore, value addition in food will increase from the existing seven per cent to 35 per cent and processing level from two per cent to 10 percent within 10 years. The states have been advised to take advantage of the various central promotional schemes and expansion of existing units, upgradation of quality control and norms. Research and development and induction of newer technologies for achieving better value addition.

The Centre has already proposed to support a network of food analysis laboratories across the country. These laboratories will help the industry to meet stringent standards of quality prescribed by the Codex Alimentarius Commission and in the domestic economy by indigenous legislation and executive orders. These measures will also support industry in meeting the challenge of competition of imported foodstuffs. The state governments have been advised to take this opportunity of upgrading existing food analysis facilities in their area.

The study further stated that to capitalise on increased market access and remain globally competitive, a continuous upgradation of post-harvest technology has become imperative to reduce cost of production and for increasing quality of marketable fresh and processed agro produces.

Post-harvest technology with emphasis on on-farm handling and storage systems for commodities, sanitary and phytosanitary measures, packaging, transport, marketing and value-addition both for domestic and export markets are important. Rich terrestrial and marine flora and fauna for extracting rare chemicals, drugs, enzymes and hormones of medicinal and nutritional importance should be encouraged.

Financial Express *24 May 2001.*

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Assocham seeks one-stop funding for seafood exports

The Associated Chambers of Commerce and Industry of India (Assocham) has demanded a single stop funding facility for seafood exporters.

According to the chamber, in view of the surging demand for Indian seafood from the US, the European Union (EU) and Japan, despite low export base and huge marine resources, there arises the need for a single stop facility for exporters to pay a flat tax and bank credit to modernize catch equipment from deep waters.

An analysis of the potential for seafood exports and marine products industry carried out by the chamber shows the country is yet to exploit fully its marine resources.

The study shows that the annual harvestable marine fishery potential within India's exclusive economic zone (EEZ) is around 4.5 million tonne, while the present production is only around 2.5 million tonne.

At present only 1.9 per cent of the total catch of fish in the country is accounted for by deep-sea fishing vessels operating under foreign collaboration/joint venture agreements, it said.

Seafood processing units in India are running at a capacity utilization of less than 15 percent. The Assocham analysis shows that exports of seafood products from the country registered a 28.2 per cent rise in terms of value in the first three months of the year 200-01. Exports during this period stood at Rs 13,026.5 million with a volume of 66.917 tonne as compared to Rs 10.178.5 million with a volume of 63.593 tonne during the same period of the previous year.

Assocham has said the seafood exporters are laying stress on value-added items rather than on bulk commodities. Therefore, the exporters have to now give top priority to quality.

Financial Express *24 May 2001*

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IIHR to profile mushroom DNA

The Indian Institute of Horticultural Research (IIHR). Bangalore, is planning to initiate work on DNA profiling for the sporeless variety of mushroom, developed at the institute. "We plan to go ahead with DNA profiling before a formal patent application for the sporeless mushrooms is filed with the relevant authorities," scientists of IIHR told ET. Oyster mushrooms, a popular variety of edible mushrooms, liberate innumerable spores, which causes respiratory allergy among the growers. To tackle the problem posed by oyster mushrooms, the IIHR was given the mandate to develop a sporeless variety. This sporeless variety, IIHR scientists say, is as good as other conventional varieties Incidentally, the problem of allergy is universal and is to be found in many mushrooms cultivating countries of the world. DNA profiling includes, among other things, identifying and profiling the place of sourcing of such products, the growth potential and also detailing the edibility status.

"The efficiency of oyster mushrooms is reasonably high. Efficiency refers to the ability of converting the sub-strata to fresh mushrooms and, in the case of oyster mushrooms, it is estimated to be around 60 per cent to 100 per cent," the scientists added.

The institute has also been given the responsibility of developing the gross domestication package (GDP) to give mushrooms cultivation a boost in the country. Under the EDP, IIHR plans to develop techniques to prevent "browning" of mushrooms and also help mushrooms cultivation at high temperatures. IIHR is also planning to develop a collection of seasonal varieties of mushrooms.

Fast Food *April 2001*

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Want fresh apples ? Just click and pluck

Himachal Pradesh would provide information on sale of apples on the Internet so that traders from various markets in the country would have correct and advanced knowledge of the varieties available in the state at different points of time during the six month long fruit season. Giving this information after inaugurating the farmer's education and training center built at a cost of Rs 2 crore by the state at Azadpur fruit market here, Himachal chef minister Prem Kumar Dhumal said apples from the state were in great demand.

"The initial experiment of the

internet sale of fruits has been successful in Kotgarh area, known as apple bowl of the state, and the government plans to extend the facility to Kullu, Kinnaur, Jubbal and Kotkhai areas through some private agencies during the next season," he said. The chief minister said the state government was giving priority to fruit processing and exported 900 tonnes of apple juice concentrate to the US and Germany this year. The Himachal Horticulture Produce Marketing Corporation (HPMC) also sold 4,000 cartons of apple wine to Kerala while the state recorded the production of 4.12 lakh tonnes of fruit this year, he said.

Dhumal said to ensure better prices to the farmers, his government would explore the possibility of direct supply of fruits to Mumbai, Chennai, Bangalore, Calcutta and some other cities instead of Delhi, which witnesses a glut every year as about 12 lakh tonnes of fruit is supplied here. According to Mr Dhumal, the production of mango in the state would be doubled from the existing 14,000 tonnes by using about 34,000 hectare land for its cultivation during the decade. He said production of mango would be encouraged in the low lying areas of Hamirpur, Kangra, Mandi,Una, Sirmaur and Solan districts.

Fast Food *April 2001*

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AP Grape Exports to go up by 40%

- Grape growing area in AP increased by 5% to 10,000 acres.
- Total production of grapes at 75,000 tonnes.
- Rise in export demand due to improved quality and crop failure in Maharashtra.

Grapes are turning out to be 'sweeter' for exporters in Andhra Pradesh this year, as their exports are set to rise by almost 40 per cent over the last year's export volume of around 300 tonnes.

The rise in export demand follows an increase of almost 500 acres this year in the grape growing area in the State to around 10,500 acres.

While the Telangana districts of Ranga Reddy, Medak and Mahaboobnagar account for more than 7,500 acres, the remaing areas are located in the two Rayalaseema districts of Chittoor and Anantapur. The total production in the State this year is expected to be around 75,000 tonnes as against 70,000 tonnes achieved last year.

The exporters said that these are currently directed towards the middle astern markets and subsequently, they will be turned towards the UK and other European countries as these European markets will be open for them between April and May every year.

They attribute the rise in demand from overseas buyers mainly to the improvement in quality and also to the losses suffered by the Maharashtra grape growers following unseasonal rains during the months of December and January.

According to them, several varieties like Flame, Thompson and Sharad-all seedless varieties are in great demand in the export markets.

Indian Food Industry *May-June 2001*

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Quit salivating, now check those labels

With even the neighbourhood grocer now stocking imported salad dressings, cake mixes, canned meats and sauces, the consumer could not have it better. However, the picture is not as cheery as it seems.

A close look will reveal missing labels, products well past the expiry dates, no declaration on the use of non-permitted colours or no details of the importer. However, unlike what is commonly believed, the importers alone are not to be blamed.

As many retail shop owners and importers inform, the problem creators are individuals, who, on their return from a foreign jaunt, smuggle goods into the country. In addition, as importer Surendar Singh of Karamel Food says, "Food items which come through the diplomatic network also lack labels and are often past their expiry dates".

Despite stringent measures laid down in Prevention of Food Adulteration Act (1954) and The Standards of Weights and Measures Rules (1977), food items without labels continue to creep into the market and the homes of unassuming consumers.

A survey of INA market revealed many violations of food laws. A well stocked INA shop had on display

pasta sauce which expired six months ago. The shopkeeper sheepishly says, "It happens sometimes. There are fresher products.

Indian Express *05 Jun 2001*

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Kerala to set up food processing park

A Rs 36 crore food processing park is coming up at Malappuram in Kerala to provide in-house facilities to processors and bridge the food infrastructure gap in the state, is near completion and land allotment to entrepreneurs has begun.

"To develop the food processing industry in the state and provide all facilities at a single site, Kerala Industrial Infrastructure Development Corporation (Kinfra) has come up with a 60 acre park in Kakkacherry in Malappuram district," its Managing Director GC Gopala Pillai said.

"The Kinfra park is tailor-made for investors due to its various benefits and United Nations Industrial Development Organisation (UNIDO) is giving its assistance in technology and marketing," UNIDO's National Expert G Mohan Kumar added.

Mr Pillai said a major part of the park was already complete and around 15 entrepreneurs had already been allotted land, while depending on the scale of activity there was room for 35-45 more processors.

While developed land was being allotted on 90 years leasehold, built up modules were offered on a monthly lease rent.

He said the thrust areas of the park would be dairy products, curry powder, pickles and coconut and spice products.

Its dedicated power supply, continuous water effluent treatment plant, quality control lab (QCL), cold storage. Research and design and communication facilities would not only help boost exports but also the market for processed food in the country itself.

Mr Pillai said the QCL has the facility of food sample testing, analysis of water and effluent samples that consist of chemical, microbiological and instrument sections.

It would ensure the safety, nutrition and wholesomeness of food, protecting consumers from contaminated and adulterated products, thereby also enabling better control on food imports.

The cold storage facility comprised sections for potatoes, onions, vegetables and frozen foods, It had an ice plant, plate freezer, packing house and refrigerated van for storing and preserving both raw materials and finished products.

The park was advantageous for investors due to comparative low lease rent, start up and operating cost, bonded area facilities and dedicated support back-up. (PTI)

Financial Express *05 Jun 2001*

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Withdraw GM food products from Indian market : Greenpeace

Environmental Organisation Greenpeace International has sounded an alarm about the detection of genetically modified (GM) ingredients in two popular food products that are freely sold in the Indian market.

"These two products could be only the tip of the iceberg where illegal entry of genetically altered food in the Indian market is concerned." Michelle Chawla, Greenpeace's genetic engineering campaigner, said on Wednesday, demanding that they be withdrawn immediately.

Providing evidence of GM corn and soya in Procter and Gamble's Pringles Potato Crisps and Abbott Laboratories' Isomil Baby food, available in most urban shops in the country, the organisation alleged that the US-based manufacturers had not sought approval required by Indian law to sell these products here.

"Not only are these companies unashamedly violating the laws of the country, they are deceiving an oblivious public," Chawla said. The organisation demanded that the companies immediately withdraw their food products.

In May, Hong Kong DNA Chips, an independent laboratory, conducted tests on a total of six products available in the Indian market. Only two mentioned were found containing GM substances, specifically corn and soya genetically engineered to be immune to Monsanto's weed - killer "round-up".

However, Chawla said it was safe to assume that these two brands could only be the beginning,

as soya and corn were present in most processed foods.

Use of genetically modified substances is in the centre of a raging controversy over the ill-effects of consuming such genetically altered food on human beings.

Though no major side effects have been detected barring allergies, a section of scientists and environmentalists have objected to such artificial "Frankenstein Food."

In India, it is illegal to import or sell any genetically engineered food products without prior approval of the Genetic Engineering Approval Committee (GEAC) under the Ministry of Environment and Forests.

Isabelle Meister, science advisor with Green peace said. "Scientists still do not know the long-term effects of releasing genetically modified organisms into the environment and people's diet." But she said the evidence was mounting.

Recently, several food products had to be recalled in the US because they contained traces of a genetically engineered corn (Star Link), suspected to cause allergies.

Though these products can be sold in Europe, Procter and Gamble have assured European citizens, that they would not use GM ingredients in their food products, but they do sell Pringles containing GM substances in Thailand.

Similarly, Abbott had assured consumers in UK and Netherlands that their products were GM free However, Isomil Soy Infant formula with genetically altered soya is sold in Philippines.

Chawla pointed out that in 2000, over 50 per cent of the soya and 25 per cent of the corn grown in the US was genetically engineered.

Since US did not segregate between conventional and GM crops, it has become a major source of genetic "contamination", she said.

In India, several local communities consume cottonseed oil, as it is cheaper. Multinational, Monsanto-Mahyco has field tested genetically engineered cotton are ready to begin commercial growing India.

Pioneer *07 Jun 2001*

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Move to amend Act on meat imports blocked

The agriculture ministry's attempt to regulate import of meat and meat products in WTO regime by promulgating an Ordinance amending Livestock Importation Act, 1898, has been rejected by the law ministry. It has advised the animal husbandry department (AHD) of the agriculture ministry to reconsider its proposal.

AHD, in an obvious reference to foot-and -mouth disease (FMD), had written to the law ministry that since meat and meat products were being freely imported after quantitative restrictions were removed, "there is an urgent need for regulating imports of meat and meat products for reasons of food safety to ensure that it does not bring disease into the country which would adversely affect animal and animal health".

The agriculture ministry had argued that the Livestock Importation Act included only horses, kine, camels, sheep and any other animal which might be specified by the Union government by notification. The Act does not include meat or meat products of poultry, pig, sheep, goat etc. Therefore, the ministry had proposed an amendment to the Act by issuing a notification so that it covers animals products such as meat, eggs etc, to restrict their import. An AHD official said, "In the WTO regime, when our consignments of mutton and live stock are sent abroad, they demand information like what is the genetic make-up of the mutton , if the feed was laced with insecticides, pesticide or fertiliser residue. We have no legal provision to ask such questions."

While rejecting the agriculture's ministry's request, the law ministry has stressed the comments of the department of revenue, made in Cabinet note, suggesting suitable amendments to section 2 of the Customs Act, 1962. According to the law ministry, "Livestock product as proposed in the note for the Cabinet is covered within the meaning of goods defined under clause (2) of section 2 of the Customs Act, 1962. Further, Section 11 of the Customs Act confers powers on the Union government for prohibition of importation and exportation of goods. " Also, sub-section (2) of section 11 provides for protection of human, animal or plant life or health as the purpose for which the import of goods can be prohibited either absolutely or subject to conditions.

To bolster its argument, the law

ministry gives instance of how an earlier notification under Section 11 of the Customs Act led to prohibition of import of animals and birds, dead or alive, or their part or produce. The law ministry, therefore, suggested that in the legislative scheme of acts on statutes book, there existed adequate provisions, namely, Section 11 of the Customs Act, 1962.

Times of India *09 June 2001*

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New tech to delay fruit ripening

Scientists have isolated a gene part, called promoter, from tomato plant and hope to use it in modified form for delaying fruit ripening by a technology that can be extended to several other perishable fruits and vegetables.

The country does not have proper cold storage and refrigerated transport facilities, which causes wastage of almost twenty per cent of all perishable fruit and vegetables due to rotting. Dr Kailash Bansal, Principal Scientist at Indian Agriculture Research institute (IARI), said.

Elaborating on the new technique called the 'antisense RNA technology', he said, the process blocked the pathway by which a fruit ripening hormone called ethylene is produced by plants.

The Antisense RNA technology involves introduction of the gene and its promoter in reverse form in tomato plant cells. The product of several gene blocks the product of the normal gene, thus preventing production of Acc Synthase enzyme.

This genetic technology would help in reducing post-harvest losses and boost exports by giving the plants an inherent capacity to delay ripening.

Business Line *14 June 2001*

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Hafed to set up cold storage complex

The Haryana State Cooperative Supply and Marketing Federation (Hafed) would construct warehousing -cum-cold storage complex in Delhi to meet the requirement of warehousing facilities in the capital's terminal market.

Besides, Hafed would create additional storage space of 2.77 lakh tonnes capacity in the State by constructing godowns at various places at an estimated expenditure of Rs 28 crore, a Hafed spokesman said.

The increased warehousing facilities in Delhi would be utilised for marketing of hafed commodities as rice, wheat, mustard oil, cotton seed refined oil and barley malt.

The cold storage in Delhi would be utilised for storage of dry fruits, groceries, fruits, vegetables and eggs. This would help in diversifying the activities of Hafed to achieve more value addition and also provide better prices to the farmers for their produce, he said.

Business Line *14 June 2001*

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Mushroom exporters eye North America

India is targeting the five lakh tonne North American Mushroom market for exports and to get around the various structural constraints, businesses are entering into turnkey arrangements with Canadian companies.

"By supplying quality culture and spawn, solar photo-voltaic machinery, giving latest technological inputs to Indian mushroom producers and buying the entire produce we intend to market Indian mushrooms in North America in a big way," Kashyap Bhatt, president Greenfield Hydroponics Systems (GHS) said. "To tap the large mushroom market in the US and Canada, we have entered into an agreement with Toronto-based GHS which will supply the raw material and technical inputs in return for the sole marketing rights of the produce," marketing director, Indo Irish Foods, Sanjay Upadhay, added.

Bhatt said GHS would provide complete canning technology, including supply of certain key machinery, to meet the exacting standards of North American market and later buy about 2200 tonnes mushrooms per annum from Bhopal-based Irish Foods.

Producing fresh white button mushrooms would cost around Rs 38 per kg and another Rs 10 for getting them tinned but they would be sold to GHS for Rs 100 per kg which would make up for the 25 per cent normal weight loss during blanching, Upadhay added. The company later intends to double its

capacity and also grow broccoli and oyster mushrooms, he said.

Bipin Shah, managing director, Riverside Mushrooms, said India was currently exporting a mere 40,000 tonnes of mushroom annually and the domestic market was even smaller at 30,000 tonnes due to severe infrastructural constraints.

Economic Times *15 Jun 2001*

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Grow tomatoes year round

Tomato is a seasonal plant growing generally from June to January and its production dwindles in summer when night temperatures are above 20 degree centigrade, But research conducted at the Indian Institute of Horticultural Research (IIHR) Bangalore, has shown that by using special hormones the yield of tomatoes can be consistently large all round the year, According to N K Srinivasa Rao, senior scientist, plant physiology, IIHR Bangalore, field trials conducted since 1999 has shown that *Arka Avinash*, a heat resistant variety, is best suited for growing in summer. The summer tomato trials with a commercial hormone Tomato- tone was taken up in hot areas of Karnataka. It showed a 100 per cent rise in fruit set and a yield ranging from 40-50 tonnes per hectare. The programme was a part of the South Asian Vegetable Research Net Work phase II program.

Economic Time *4 June 2001*

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Mango exports likely to go up to 50,000 t

Mango exports are likely to rise to 48,000-50,000 tonnes this year before the season ends in August with almost 80 per cent of the shipments being moved by air, an official said today. Mango exports for the last two years have averaged between 30,000-35,000 tonnes, the official said.

"The mango season begins in January, with May, June and July being the peak months. This year the crop is good and demand from overseas is also good," an official of Agricultural and Processed Food Products Exports Development Authority (Apeda) said.

The main export points for mangoes are Bombay, New Delhi and Madras, The southern city of Hydrabad is another exporting city. Mangoes from India are exported traditionally to the Gulf, with a small per cent going to Europe.

This year mango exports from India will also find their way to southeast Asian countries such as Malaysia and Singapore, the official said.

India's airports authority said its cold storage facilities for perishables were adequate to meet demand at the various airports.

Economic Times *9 June2001*

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India gets patent on tamarind

Having lost the neem patent to multinational companies, Indian scientists are increasingly turning their attention to adding value to products from plants and trees traditionally used by people for food and medicine before any foreign company sets its eyes on these. Scientists at the National Chemical Laboratory (NCL) in Pune have demonstrated this by developing a process for the recovery of value-added products from tamarind -a native Indian tree that is as common as neem. NCL has filed four patents based on the know-how developed and has already been awarded a US patent no . 5, 994, 533. MG Kuikarni, one of the developers of the process says tamarind will not go the neem way. Tamarind pulp contains around 13 per cent tartaric acid (As a mixture of tartaric acid and potassium bitartarate), 5 per cent pectin and 33 per cent fruit sugar, "All these belong to a group of products popularly known as neutraceuticals which is growing business worldwide," says Kulkarni in a report in + nature-news India+.

Economic Times *4 June 2001*

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Genetic method found to delay ripening

Scientists have isolated a gene part, called promoter, from tomato plant and hop to use it in modified form for delaying fruit ripening by a technology that can be extended to several other perishable fruits and vegetables. The country does not have proper cold storage and refrigerated transport facilities which causes wastage of almost 20 per cent of all perishable fruit and vegetables due to rotting, Dr Kailash

Bansal, principal scientist at Indian Agriculture Research Institute said. In this technique the pathway by which a fruit ripening hormone, called ethylene, is produced by plants is blocked, he said.

Economic Times *14 June 2001*

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Top Chinese award to Indian rice breeder

China on Wednesday awarded renowned Indian scientist G S Khush with the International Scientific and Technological Cooperation Award for his role in promoting agricultural research and increasing rice output. Mr Khush, who is one of the world's premier rice breeder and head of the plant breeding, genetics and biochemistry division of Manila based International Rice Research Institute, was presented the award by Chinese minister for science and technology Xu Guanhua.

Economic Times *14 June 2001*

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GM food industry searches for health and happiness

One bite of a genetically modified apple and you're svelte and happy. Two bites of a GM peach and your thighs are toned and then maybe, just may be, British consumers will buy biotech food.

The need for something to turn the public's fears of the new technology into love is felt strongly by industry proponents increasingly depressed that the British still shun GM foods.

They hope that if they can promise to bring health to the nation, consumers will overcome their worries about genetic modification, which many fear could usher in a new food or environmental debacle.

"We must lay the dragon of food safety to bed," Lord Haskins, chairman of Northern Foods Plc, told a recent UK conference organised by the US embassy, the Royal Agricultural College and the School of Oriental and African Studies.

"After the events of the last three years, no supermarket is going to get back into genetically modified food until they can prove there's benefit. It could be taste, flavour or price but I think it will probably be the health one," And so the rush is on to start producing and marketing gene-modified, cholesterol-busting foods to a European public that increasingly fears scientists are meddling with its daily bread and companies messing up the countryside.

But most agree that the British look set to resist, Mad cow disease left a bitter legacy in Britain, mainly after the government of the time was seen to have misled the public over the dangers of eating meat.

Newspaper pictures of the then Conservative minister for agriculture John Gummer feeding his young daughter a burger made of British beef in a bid to show that meat was safe is recalled by many as a government betrayal.

"I can understand why consumers are fearful of GM foods," said Deidre Hutton, chairman of the National Consumer Council.

"People see that scientists get it wrong. They're not going to be pushed into anything." She said it would take a long time for any real debate on gene foods to take place, telling biotech companies that kneejerk panic over so called Frankenstein foods was set to continue.

Economic Times *16 June 2001*

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Wine tablets for your heart

French wine growers have found a way of combating their chronic over-capacity with a clever new product aimed at the health - conscious teetotaller-wine tablets for the heart. Inspired by the growing scientific evidence that red wine is good for you, the French Distilleries Company (SFD) in the southern Ardeche department has begun producing a powder made up of polyphenols - the molecules in which the therapeutic properties are presumed to reside.

Turned into capsules or tablets, and bearing the brand name Provinols, the product has gone on sale in health shops in the US, Northern Europe and Asia with the promise of helping reduce rates of cardio-vascular illness. "It's now an established fact that drinking red wine helps cut heart disease, even if the scientists don't know exactly how,' said the SFD's director of research David Ageron.

"We are aiming at the people who don't drink wine either because they don't like the taste or because they don't take alcohol and offering them the chance to enjoy its beneficial effect." What's become known as the "French paradox" has been observed for years. The fact that despite their higher consumption of tobacco and alcohol, the French enjoy a much lower rate of heart-related illnesses than North Americans.

Over the last 20 years research has built up suggesting that the reason is red wine. A study of 34,000 French people published in April for example showed that "regular and moderate" consumption of red wine reduced the risks of cardio-vascular disease by 30 percent. The polyphenol powder, which bears a dark red colour, is produced by gradually removing all the other elements from the wine ; sugar, minerals, organic matter, water and alcohol.

Times of India *17 June 2001*

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Spurt in food processing IEMs

Since the deregulation of the food industry under the new Industrial Policy of 1991, there has been a spurt in filling of Industrial Entrepreneures Memoranda (IEMs) in various subsectors of the food processing industry.

Till December 2000, a total of 6, 427 IEMs have been filed in the food processing sector envisaging an investment of Rs. 53,819 crore. But of the IEMs filed during the period, 678 IEMs envisaging an investment of Rs. 7,517 crore have already been implemented.

Apart from these 1,132 approvals have been granted till November 2000 envisaging an investment of Rs, 19,388 core for setting up of 100 per cent export oriented Units / Industrial Licenses in various sectors of food processing.

Out of these, 250 proposals envisaging an investment of Rs 4, 227 crore have already been implemented.

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Ripe For Reproach : The mango's tango with chemicals

Mangoes might be the juiciest option this summer, but going by recent reports on the process used to ripen the pulp power of the aam, it might just be a forbidden fruit in the Capital's context. The use of calcium carbide a chemical which is believed to be carcinogenic in nature to hasten the process of ripening has whipped up a tongue-twisting storm in the city. The sceptics, of course, beg to differ.

According to Mango Merchants Association president Sudesh Sachdeva, "For one, there is no proof to prove that calcium carbide is carcinogenic. Then, the chemical is restricted to extraneous use in that the mangoes in a basket are always kept in a wrappers. As regards the process, as soon as moisture comes in contact with the chemical, heat is produced and this heat hastens the ripening of the fruit."

Mango trader Tejinder Singh, however, has a diametrically different viewpoint. "The use of calcium carbide is banned and only those who are not aware of the law deploy the chemical to expedite the ripening process of mangoes." Side by side, Singh concedes that fruits of all flavours make their way to the metro's Mandis in a raw state and are subsequently put through artificial processes to make them ripe. "More often than not, it is acetylene -a permitted chemical which is used; calcium carbide is the exception rather than the rule,' he offers.

Adding a twist to the table is B S Garg, head of Delhi University's department of chemistry. 'When it comes in contact with moisture, calcium carbide, which is a solid component otherwise , tums into acetylene gas, which is also employed for welding and lighting of lamps, is harmful, but is made use of by fruit-vendors."

Incidentally, cancer expert S C L Gupta has it that "Calcium carbide is not carcinogenic in itself, but the use of the chemical to speed up the ripening process is banned by rule 44A of the Prevention of Food Adulteration (PFA) Act since is destroys the nutrient value of fruits."

Even as the debate over the use of calcium carbide gains heat, what seems to be compounding the confusion is the PFA department's role in the matter. "Since the mango is a perishable commodity , there are no set standards for testing adulteration. While we are normally

required to lift samples for testing, our options are limited in the case of fruits," informs a senior official of the PFA. This brings us to the question : is ignorance bliss or should one sniff before one bites? Yes, its succulent charm notwithstanding, there is more than one reason why the mango presents appetising food for thought this season.

Times of India *23 May 2001*

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Chittoor fruit processors seek HACCP certification

The Chittoor District Fruit Processors' Association is persuading its members to go in for Hazard Analysis Critical Control Point (HACCP) certification. Of the association's 32 members, 9 units have received the HACCP certification and the others are in the process of doing so. HACCP is a quality control process which helps identify hazards in the food processing industry, devising steps to overcome the same. "In the long term, the association believes members must adopt best manufacturing processes to enable them to meet competition. This is particularly true after the removal of quantitative restrictions," a member of the association told ET.

The decision to seek HACCP certification was, the member said, driven partly by quality considerations. Besides the export market, HACCP certification can also help in selling the product in the domestic market, the member added.

The entire programme is being kept as a voluntary endeavour with the units being educated about the benefits. The process of receiving the certification though is a time consuming one with at least a year needed before a unit obtains it. The federation has sought the assistance of a Bangalore-based food technologist to help the units receive the certification.

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Financing of Energy Efficiency / Conservation Projects

Indian Renewable Energy Development Agency Limited (IREDA) is a Government of India enterprise engaged in the financing of Efficiency & Conservation Projects in industrial / commercial, domestic and agricultural sectors. It has been observed that Indian industries / Commercial enterprises consume up to 50% of more energy in comparison to their counterparts in developed countries, conservation of which can greatly improve the profitability. With the opening of economy and in WTO regime, reduction of input cost is the keyword for survival of industries and energy is one of the major input costs.

IREDA is now operating a World Bank fund for financing such energy saving measures and term loan can be availed from IREDA to the extent of 75% of total equipment cost with maximum 10 years repayment period. The interest rate applicable for the scheme is 14% p.a. and there is 1/2% p.a. interest rate rebate for timely repayment of IREDA's loan. In addition, Custom Duty /Excise Duty exemption is available for equipments procured out of the IREDA's loan assistance.

For further details, IREDA can be contacted at :-

Indian Renewable Energy Development Agency Ltd.
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INDUSTRY NEWS

Flavoured Mineral Water

Singapore-based Sheng Holdings is on the lookout for a marketing partner in India to launch its brand of Flavoured mineral water, Ice Cool. The company launched its flavoured mineral water in South East Asia in August last year. "We see an opportunity for our flavoured mineral water in the Indian market, as we have high quality standards and the pricing would be around Rs 10 or Rs 15 per bottle," remarked the Sheng representative, Ms June Teh Poh Hong.

The company has three flavours of mineral water strawberry, orange and black currant-and is planning to expand its product portfolio in the South East Asian region.

With mango being available in India in plenty, the company is also planning to launch mango puddings, besides exporting mango puree out of India. The other products of Sheng Holdings include tender coconut juice and energy drinks.

Processed Food Industry *April 2001*

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Philip Morris enters fruit drinks

Philip Morris subsidiary KJS India has announced foray into the Rs 100 Crore fruit drinks market with the launch of Powdered drink Tang. The company plans to set up a manufacturing facility at Hyderabad by June this year at Rs 25 crore investment, adding till then the supplies will be imported. In a statement, head of KJS India Mr. Giuseppe Frittella said the company has entered into a distribution tie-up with Dabur Foods, and Tang will be rolled out to over 20,000 retail outlets in Mumbai, Delhi, Chennai, Bangalore and Hyderabad.

Processed Food Industry *April 2001*

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Composite cans

Promising eco-friendliness and ease of use, DS Foods has set up Asia's First composite can making unit at Noida at a cost of Rs. 25 crore, with an installed capacity of 50 million units per annum. The cans carry an added attraction to the cost-conscious, as it costs as much as 25 per cent less, compared to the traditional tin packaging used for the food products.

The DS Canpac unit employs two globally patented technologies: Paper bottom, which gives additional advantages and replaces conventional tin bottoms. This makes Canpac cut down on recycling cost. The bottom is simply heat sealed on to the body.

The other unique technology is a tear-off membrane, a safer option as compared to conventional metal closures. The membrane is heat sealed on to the body, instead of being seamed on to the can. There is no chance of a nick or a cut while opening or using the can.

Swiss major INDOSA's international trading arm Canpac International AG has supplied the patented technology to DS Canpac, having diverse interests in tobacco, engineering, food & beverages and packaging. Canpac composite packages sport food-grade lacquer coated paper top, which peels off quickly leaving smooth edges.

Products that have a corrosive action against paper are guarded by the lacquer that acts as an effective barrier against food contamination and is said to be safe for baby-foods and other processed food products.

Processed Food Industry *April 2001.*

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Modern abattoir in Chennai to be commissioned soon

Chennai could become one of the earliest cities in the country with a modern mechanized abattoir run on a build-operate-transfer (BOT) basis if the project begun recently gets commissioned.

The project, the foundation stone

for which was recently laid by the Mayor, Mr. M.K.Stalin, plans to convert the present corporation abattoir at Perambur to a modern facility, with one section for slaughtering sheep/goats and the other for bulls/buffaloes.

Processed Food Industry April 2001

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Ticket to London with MTR meal

The next time you buy a pack of MTR heat -and -serve food, it might turn out to be your passport for a weeklong, all expenses paid trip to London.

The British Tourist Authority has embarked on a joint promo with the Bangalore-based foods major and TT Travels for this venture. Winners of the scheme will get to fly to London, courtesy BTA, where they will be hosted by hospitality major, Forte Hotels.

The first 50,000 packs of any of MTR's heat-and -eat packs will come with a holiday offer and a form for the 'Ready-to-Eat-Ready-to-Fly' contest.

The first prize is a weeklong London trip for two, including sightseeing and unlimited City travel passes. The second prize is a three-day stay in London for one person and travel and sight seeing. Courtesy BTA and Trafalgar Tours, who have a tie-up with TT Travels in Bangalore. The contest is on till June.

The British Tourist Authority, which is promoting Britain as the favoured destination of Indians, is targeting software professionals.

IT companies send representatives to the US for assignments and the BTA pegs on making London a stopover for them.

MTR has been in the foods business since 1942. It recently launched its range of ready-to-eat foods, including *bisi bele bhat, kesari bhat, khara bhat, pongal, channa masala, navratan kurma and rajma.*

The packs are being distributed to .travel agents in Bangalore, Chennai and Hyderabad to popularise the contest.

Business Line *5 May 2001*

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ConAgra to export food ingredients

The US food major. ConAgra, is keen on exporting processed food ingredients from India. The multinational company has already identified a few Indian producers for a strategic alliance or a marketing tie-up in this regard.

ConAgra is also confident that its Indian subsidiary, Agro Tech Foods Ltd (ATFL), will become a $500-million company within the next five years. It is expecting ATEL's sales to grow at a rate of 20 per cent per annum.

ATEL, formerly known as ITC Agro -Tech Ltd, was acquired by ConAgra three-and -a-half years ago from ITC, Ltd. Last fiscal,the company made a turn-around and for the first time since its acquistion posted a net profit of Rs 1.9 crore.

ConAgra's President and Chief Operating Officer, Mr Larry A.Carter, told Business line that the US-based global player was looking at India as its "primary business opportunity in Asia over the next decade". He felt that India had better climate than China for private enterprise. ConAgra is currently exporting processed capsicum products, vegetables, dehydrated onions and more specifically, processed spices. The company's priority would be to join forces with Indian producers. "They know the local environment and we know the end-market. If India can produce a product that can be sold in the US or Europe, ConAgra has the infrastructure and the distribution capabilities to market it. "Mr Carter said.

However, ConAgra is still undecided about the kind of partnerships it would enter with the Indian firms. "It could be any where from an equity participation to a simple marketing arrangement." He said.

According to him, the processing technology already existed in India. Hence, there was no need for conAgra to bring in the technical know how. But the technology had to be adapted to the product that was customized in different parts of the world.

For example, he said, a food company in Europe or the US wanted 10 different spices blended in a suitable -formulation. Here, ConAgra could work with the Indian firm to develop the formulation so as to give the particular European or the American company the flavour it wanted.

With regard to Indian operations, he said ConAgra was primarily looking at basic foods. Apart from consumer packs, AFTL proposed to sell its Healthy World Atta (Wheat flour) to bakeries in bags of 25 kig and 50 kg. The company was also looking at opportunities in snacks business.

Last fiscal, AFTL acquired Rath brand of vanaspati from Siel and restaged it to enhance the brand's competitiveness. Its Sundrop brand of sunflower oil continued to retain its market leadership in the refined oil consumer pack market.

Business Line *11 May 2001*

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Beat the heat with Mango Panna

Diamonds has launched Mango *Panna* to beat the scorching heat in a more natural way. A perfect blend of green mango, mint, cumin seed, lemon and ginger, Mango *Panna* is priced at Rs 75 for a 600 gm bottle. Mango *Panna* is also available in a small pouch of 40 ml at an introductory price of Rs 5.

Financial Express *23 May 2001*

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Nirula's to launch 'healthy' breads

The Rs 1,630 crore domestic bread market is likely to witness action of another kind.

The homegrown Niruls's, credited with having 'invented' the concept of fast food in Delhi, is set to introduce a range of specialty breads positioned on the health platform.

The specialty range comprises 14 varieties. The prices range from Rs 36 at the premium end for 'cinnamon raisin bread' to Rs 5 for a 'hard roll' Among the other flavours that will be unveiled later this week are onion bread, high-rise milk bread,buttermilk rye bread, herbal bread, cracked pepper focaccia bread and caraway roll.

While Nirula & Company has already been selling milk breads, fruit breads, garlic breads and farmhouse rolls, this is the chains's first foray into health breads.

The new range will be sold on the 'good for health' plank. Speaking to *Business line*, a company official said the fibre-rich range of breads contained neither sugar nor oil. "With the exception of a few varieties comprising olive oil which is healthy, the new range is free of sugar and oil," the official said. The breads have been produced and tested at the chain's production facility in Noida near Delhi.

According to research consultancy firm KSA Technopak, of the Rs 1,630 crore domestic bread market, the share of the organized sector averages less than 50 per cent, despite the presence of big players such as Modern, Britannia and Harvest Gold, The overall bread market, however, has been registering growth rates of 18-20 per cent in the past few years.

Apart from breads, other products manufactured out of independent Nirula's units are sauces, syrups, ketchup, jams and mustard. While the food production and processing is done in-house, its dairy plant takes care of the ice-cream and cheese.

For fiscal 2000-01, the Nirula's chain claims a systems-wide sales turnover of Rs 90 crore. Currently restiricted to a presence in and around Delhi, Nirula's is hopeful of foraying into 40 cities by 2003.

Business Line *24 May 2001*

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Thiamine enriched *Basmati* from LT Overseas

LT Overseas will soon be launching Daawat Gold Enriched Basmati Rice in India as well as in the international markets. Daawat Gold will have 15 per cent thiamine as againt normal Basmati rice which has only 0.0004 per cent of thiamine.

LT Overseas has developed the enrichment technology with the help of experts from Indian Institute of Technology, Kharagpur. The enrichment process involves imbibing the rice with thiamine after it has undergone dehusking and polishing. This will be done at the company's Rs 25-crore plant at Bahalgarh in Haryana.

The rice will be available in 1kg and 5 kg packs, of which the latter will cost Rs 264.

Indian Food Industry *May-June 2001*

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Regional specialties from Tasty Bite

Tasty Bite Eatables, offering branded ready-to-eat Indian entrees in the country, is now getting into

regional specialities. While it will continue to make generic national products like *palak paneer* and *dhal makhani*, Tasty Bite is launching a range of regional specialties starting with *pav bhaji* , *avial* and the likes of *undhiu*, a Gujarati premium delicacy.

The idea is to offer a full menu for the Indian consumers. While the launch of regional specialties will happen by the end of this year, the list of specialties itself will keep expanding.

For over a year, the company was test marketing its product in select markets like Chennai, Bangalore and Hyderabad, which showed a clear need for such a product. The emergence of quality retail shopping environment, which allows opportunities to display more products and also give the touch and feel factor has helped in promoting the products.

Indian Food Industry May-June 2001

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Tropicana works up for Juicy growth

Tropicana Beverages Company, a part of the PepsiCo group, plans to introduce new flavours like tomato and mixed fruits shortly.

Incidentally, the new flavour, sweet orange, is being targeted at those customers who are not used to the regular orange flavored juice, which Tropicana sells world-wide. Besides this, the company is planning to introduce new flavours into the market, clearly aimed at helping the company maintain its leadership in the juice market.

Tropicana is also exploring the possibilities of local production of juices from Indian fruits like mango. The juice market in India is valued at Rs 100 crore, with Tropicana having close to 30 per cent share, a volume which the company hopes to raise to around 40 percent within the next 12 to 18 months. The company was positioning the product as a health drink. Tropicana is available on a selective basis in over 14,000 outlets spread over 16 cities of the country.

Indian Food Industry May-June 2001

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Aseptic pouch Machinery from Nichrome

- Increased shelf life for milk at cheaper cost.
- Can eliminate need for cold chain for milk distribution.
- Horizontal 'standi pouch' being developed for fruit juices and drinks.
- Possible competition to Tetra Pak.

The Pune-based packaging machinery manufacturer, Nichrome Ltd, is set to launch a new line of machinery for making aseptic pouch packaging for milk, a product that will enhance the shelf-life of milk.

The company is also simultaneously working on developing a horizontal 'standi pouch' for packaging fruit juices and drinks as a more economical alternative to the existing aseptic packs being used by manufacturers for packaging for such products.

The company is gearing up for a September launch of the aseptic pouches, which will allow milk producers to completely eliminate the cold-chain for transporting the milk and expand their area of operation by considerably increasing shelf-life of the product. The product can be customized to allow milk manufacturers the flexibility to offer long-life milk to customers at various price points.

The company has already invested over Rs1 crore in developing the aseptic pouch machine prototype and expects to spend the same amount, before the design is finished for launch by September.

Earlier, Nichrome and Tetra Pak India, a 100 per cent subsidiary of Tetra Pak Sweden were partners in a venture called Tetra Pak Nichrome India, but the Swedish firm decided to quit from the venture amid heavy losses and poor sales. "Tetra Pak's marketing global arm did not like the idea of selling pouch filling machines as it was cheaper with less profit margin and started competing with their own machines. The technology was ours and they were to market form-fill- seal pouch machines", said S V Joshi who pioneered India's first plastic food grade milk packaging for Kurla Dairy at Mumbai in March 1978.

Tetra Pak India had picked 50 per cent equity in Nichrome in September 1995 at a cost of Rs 7.5 crore and had committed to market 100 machines per annum valued at $ 45,000 each. "Tetra Park India lifted only 340 machines in the first 3 years of entering into the tie-up

as against the commitment to market 100 machines per annum.

Indian Food Industry May-June 2001

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Coca-Cola to Transform from Soft Drinks Company to a Beverages Company

- Plan to sell water, tea, coffee, powder drinks and juices.
- Non-soft drink beverages to increase from present 4% to 20% in total sales.

Soft drinks giant Coca-Cola India has chalked out a stragegy for increasing volumes in the Indian market. In line with its global strategy, it plans to transform itself from being just a soft drinks company to a beverages company.

For this purpose, the company plans to sell water, tea, coffee, powder drinks and juices apart from its core brand of soft drinks. At present, the sales ratio between soft drinks and other beverages in 96:4. The company intends to change this to 80: 20 in the next three years.

The company has already made an entry into the bottled water market in India through Kinley. The company does not rule out the option of launching another brand. For juices, the company is looking at various options. Its juice brand 'Mazaa' acquired from Parle a few years ago is being given a major thrust. Apart from mango, it is being launched in other flavours. The company will go in for packaged tea. For all the brands launched or to be launched, the company is looking at the local market for sourcing. However, soft drinks will continue to be the primary focus for Coca-Cola.

Indian Food Industry May-June 2001

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Parle Bisleri's expansion Plans

- Rs 260 crore to be invested on distribution network and bottling capacity.
- Home delivery facility for 20 liters packs introduced.

Parle Bisleri plans to invest Rs 260 crore to expand the distribution network and bottling capacity. Bisleri currently holds a 70 per cent market share in India's Rs 700 crore branded mineral water market. The company plans to invest Rs 60 crore for expanding the existing facilities whereby the bottling capacity will be doubled to 200 million cases a day and an additional Rs. 200 crore for expanding the distribution network by five times. It has also introduced home delivery facility for its 20 litre pack (Rs 70 MRP) which will be delivered by a specially designed fleet.

Indian Food Industry May-June 2001

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Dabur to add Fruit Juice Variants, Papads and Pickles

- New venture into papads and pickles.
- Announces price increases for some new flavoured beverages.
- Plan to expand its export market.

Dabur Foods Ltd, which will break even in fiscal 2000-01, is working out an aggressive expansion plan for its fruit juices portfolio. About four fruit-based beverages are expected to be introduced within the current year.

The company is also foraying into papads and pickles, a bastion dominated by the unorganished sector.

Both papads and pickles are already being test-marketed. Four variants of papads are being test-marketed in Chennai-Punjabi Masala, Urad and two appalam flavours.

Meanwhile, the company announced a packaging innovation for 1-litre packs of its fruit juice brand, 'Real'. The brand will henceforth be made available with a spin cap, devéloped in partnership with Tetrapak, apart from a six layered composite carton with double seal capping. 'Real' is currently available in five flavors-orange, mango, pineapple, mixed fruit and tomato. Dabur Foods also announced a price restructuring for all 'Real' variants, due to upgraded packaging.

The prices of 'Real' orange, mango and tomato flavours have been hiked from Rs 58 to 60. The prices of 'Real' mixed fruit and pineapple flavours have been increased from Rs 65 to Rs 68.

However, prices of the 200ml pack size have been reduced from Rs 15 to 13 for the orange and pineapple flavours. The price of the

mango variants has been reduced from the earlier Rs 12 to Rs 10 now.

The brand is available across 55 towns, across 75,000 retail points. Dabur Foods is also planning to step up its presence in the export market with 'Real'. Besides, the company intends to enhance the media presence and sampling and school-based programmes for the 'Real' brand. The company has a manufacturing base in Nepal for the 'Real' brand.

Indian Food Industry *May-June 2001*

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Britannia to acquire 49% stake in Kwality Biscuits

- Trademarks and designs owned by Kwality biscuits bought by Britannia for Rs 30 crore.
- Acquistion of equity during this financial year.

Buscuits major Britannia Industries Ltd. has acquired Kwality biscuits Trademark 'Kwality', the chef symbol and several other trademarks owned by the Bangalore based company for a total value of Rs 30 crore.

The company has also agreed 'in-principle' to acquire 49 per cent equity of Kwality biscuits. The transaction is expected to be completed during the current financial year.

Britannia has in recent years revamped its corporate image and marketing strategy and introduced a number of new biscuit brands to cater to various segments. It has also expanded its distribution reach and plans to double its network in the rural markets. Britannia is a major player in the bread industry with a 5 per cent share of the bread market. During the last decade, Britannia consistently lost market share in bread to Modern Foods. However, the sector has now been deserved and the Government has withdrawn supply of subsidized wheat to Modern Foods. Britannia has been increasing its focus on the premium segments.

Its strategy is not to grow in terms of volumes but to maintain margins.

In the biscuit market, Britannia and Parle have shares of 15 per cent and 10 per cent respectively. In the organized biscuit market, Britannia has close to 40 per cent market share and Parle around 30 per cent. Kwality Biscuits Pvt. Ltd., too has been expanding its presence to other parts of the country.

Britannia Industries, riding on low-priced biscuit packs for accelerated volume growth over the past year, could, however, be impacted aversely by the hike in excise duty from 8 per cent to 16 per cent on biscuits in small unit packs. Volume growth in the lower-end biscuits segment could slow, according to an analysts.

Indian Food Industry *May-June 2001*

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India, NZ agree to collaborate on food safety

India plans to collaborate with New Zealand in the food segment, particularly with respect to processing, safety and standards.

New Zerland's Ag Research has agreed in principle to exchange trainees and trainers in food processing and to work with Indian counterparts in the field of food safety and standards, particularly for meat and meat products, according to an official release issued here on Thursday.

This follows the visit of an Indian delegation to New Zerland, led by the Minister of State for Food Processing, Mr Chaoba Singh.

Private firms such as Pro & Associates and Fletcher Construction Co are expected to take projects in the country for upgradation of infrastructure facilities in the sector.

Agreements between the two nations in the honey and fruit juice sectors are also in advanced stages of finalisation, the communiqué said.

Business Line *8 June 2001*

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Heinz to buy Borden Foods sauce unit

Ketchup maker H.J.Heinz Co said on Wednesday that it agreed to buy Borden Foods Corp's pasta sauce, soup and bouillon businesses, adding Classico, Mrs. Grass Recipe and Wyler's brands to its product lines. The companies, to be acquired for an undisclosed sum, have annual sales of about $270 million.

In the transaction, Borden Foods will sell to Heinz its Classic pasta

sauces, Aunt Millie's pasta sauce, Mrs. Grass Recipe soups and Wyler's bouillons and soups. Heinz also will acquire the Catelli, licensed brand Gattuso and Bravo pasta sauces, which are Canadian brands.

In a separate news release, Heinz said the brands would add to its condiment and sauce product line and would complement its private-label soup business. It has been trimming costs and trying to revive sales of traditional food lines such as pasta through acquisitions and overseas growth.

Business Line *08 June 2001*

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Tasty Bite takes on MTR ready-to-eat on home turf

Tasty Bite Eatables Ltd is all spiced up to take on its rival, the Bangalore-based foods major, MTR, on the latter's home ground.

The Pune-based ready-to-serve foods company has chalked out its bite-by-bite strategy to eat into MTR's shelf-space, As a first step, it has slashed prices of its products. And, by this month end, the company will unpack a host of South Indian ready-to-eat foods. The southern menu includes products *like avial, bisible bhaat, khaara bhaat* and the Punjabi delicacy, *sarsan da saag*.

The company aims to allay the existing perception of dishing out a purely North Indian fare and give it a national appeal.

The new ready-to-eat range will be rolled out in Chennai, Hyderabad, Delhi and Mumbai within the next four months.

"Our strategy very clearly is to launch products which are perceived to be specific to a region, but have a large audience outside that region. The emphasis will also be on products that have a festive touch to it or is otherwise difficult for people to prepare," Mr Ravi Nigam, President, Tasty Bite Eatables, told *Business Line*.

"The focus will be to have a product portfolio and meals with excitement around it, "Mr Nigam said.

Meanwhile, the company's latest offering, *pav bhaji*, has proved to be a success, Mr Nigam said. "In Mumbai, we were selling 25,000 meals a month before the launch of the *pav bhaji* in April. Now we are almost selling 50,000 meals. The focus now will be to launch products like these which have mass appeal," he added.

The company also slashed prices of its products from Rs 55 for a two-servings pack to Rs 30-40. Mr Nigam said the move was based on market studies, which found that core consumers were nuclear families, and not bachelors, as was earlier expected. MTR too had launched its ready to serve packs at a much lower price point.

"Consumer feedback was that they ended up paying Rs 110 for a meal, for four which is expensive," Mr Nigam said. The company has also launched its *pav bhaji* in a family value pack-Rs 65 for 4-5 servings.

Business Line *14 June 2001*

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Health food

Smith & Jones, an international food ingredients brand, has launched Smith & Jones Baked Beans in the Indian market. These protein beans are processed with English tomato sauce. Smith & Jones comes from the house of Capital Foods Ltd. These baked beans reportedly have the right amount of heart-healthy nutrients. They are low in fat and chock-full of protein and fibre. They also provide important vitamins and minerals, including iron, folic acid, zinc and potassium, according to press release. The Smith & Jones Baked Beans is packaged in cans, and is priced at Rs. 40.

Business Line *14 June 2001*

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Coke set to snap up water biz of Thermax Culliagan

Coca-Cola is once again on a takeover mode, a la Ramesh Chauhan. In a bid to emerge as a dominant player in the bottled water market, Coca-Cola is taking over the Pune-based 20 litre packs water business of Thermax Culligan Water Technologies Ltd (TCWTL), a 50:50 joint venture between Thermax India and Culligan of US formed four years ago.

This time there is no buying out of brands. The strategic deal will instead see Thermax Culligan

withdrawing its 20-litre water brand, Good Water, from the market which will give Coca Cola's bottled water brand, Kinley, the advantage of using the 40,000-litre per day capacity plant of TCWTL at Taloja near Mumbai.

Under the arrangement, Good Water's institutional business is sought to be transferred to Kinley. This means the Kinley will get 1,600 bulk customers of TCWTL in Mumbai and Pune. Good Water has 25 per cent market share in the 20 litre category which includes large business houses and institutions. Whether Coca-Cola is immediately buying out the Taloja plant could not be ascertained and Coke refused to spell out a figure for the deal.

But what sources told ET is that Coca-Cola is going all out to either buy-out or tie-up with strategic partners in almost every metro and mini-metro. The game plan is to bite off a chunk of the 20-litre water jar segment which is understood to be 40 per cent of the Rs 500 crore bottled water market. Kinely 20 liter water jars have been introduced in Mumbai and Pune markets this week. The company is also in the process of entering into an alliance with a Delhi manufacturer and has already tied up with Black Diamond Beverages, its franchisees in West Bengal, to launch all pack sizes of Kinely water in the east.

When contacted by ET, the CEO of Coca-Cola India Alex Von Behr said, "India provides a great opportunity for the makers of pure drinking water. We already have a 10 per cent share of the national mid-sized retail pack segment in less than 10 months, In fact, we are already second ranking brand in the market. In Mumbai, our share of the market in 500 ml and I liter categories is 14 per cent,"

The action seems to have shifted to bottled water where every FMCG multinational worth its salt is trying to gain a foothold. While bottled water in evolved markets like US, Europe, is pitched as a lifestyle product, in India it is focused on health and safety.

If the latest ORG Marg retail audit figures for March 2000 (midsize packs) are anything to go by, the Ramesh Chauhan-owned Bisleri has a market share of 53.3 per cent (500ml to 2000 ml) followed by Kinley at 10 per cent . Kothari Beverages' Yes has a share of 6.5 per cent, while Bailey and Acquafina has 5.4 per cent and 4.5 per cent market shares respectively. The Hello brand has a market share of 1.6 per cent.

Economic Times *31 May 2001*

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FAIRS & SEMINARS

EU-Malaysia Partenariat-2001 November 5-6, 2001, Kualalumpur, Malaysia.

The above matchmaking event supported by Asia-Invest offers on opportunity to meet future business patners in various fields including Food Processing and packaging, Machinery & Equipment, Environmental Technology etc.

For further details contact:

Ms. Siaw Lean Sim
Federation of Malaysian Manufacturers.
P.O. Box 28, Jinijang, 52000
Kuala Lumpur, Malaysia.
Tel : + 60362761211
Fax : + 60362741266 / 7288
E-mail : leansim@fmm.org.my

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Saitex'2001, September, 25-29, 2001, Johannesburg, South Africa.

India Trade Promotion Organisation is organising national particpation of the Indian trade and industry in the above premier South Africa Industrial Trade Exhibition. The space rentals charged this year are highly subsidised.

During the previous Saitex' 2000, orders booked by the participants at India Pavilion, was reported to the tune of Rs. 23.25 lakhs and business under negotiation was Rs. 4.46 lakhs.

Interested parties may please contact, Mr. Amrit Singh, Dy, General Manager, ITPO, Pragati Maidan, New Delhi - 110001 Tel : 3318142, 3320855, 3317896, Telex : -031-61022, 031-61311 Comxh in 031-65155 Adep in cable: comexh.

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Worldwide Food Expo-2001, October 18-21, 2001, McCormick Place, Chicago, USA.

The sponsorers of this Expo are American Meat Institute, International Association of Food Industry Suppliers and International Dairy Foods Association. The United States Commercial Services (US & FCS) is leading an Indian delegation to the EXPO.

The delegates will have the opportunity to meet 1200 companies exhibiting innovative packaging & food processing machinery, processing and packaging that includes prepared food products, bakery & snack foods, beverages, dairy products and others.

Interested persons may please contact: Savio A. Gonsalves-Director, U.S & Foreign Commercial Service. Call (P.P) -079-7552563/ 7550875; Fax : (P.P) 079-755 2924

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National Seminar on "Globalisation-Impact on Indian Food Processing Industry", 19th October 2001, New Delhi.

Eminent speakers will be presenting papers on different aspects of the theme.

Nominal Delegate fee of Rs 100/- per head has been fixed.

Interested persons may contact :

Hony. Secretary
ASFT(I), Delhi Chapter
206, Aurobindo Place Market
Hauz Khas, New Delhi -110 016
Telefax :011-6510860

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Ahar- 2001 Exhibition, November 1-4, 2001, Ahmedabad.

Mr. Piruz Khambatta, Chairman, AIFPA-Gujarat Chapter would be a presenting partner of the above mega event.

Ahmedabad is fast becoming the food capital of India with maximum percapita consumption of processed food and the maximum number of eating-joints per sq. mt urban area. This exhibition offers a good opportunity for all food processors and the members of AIFPA to participate and promote their products.

Exhibitors would get 15% special discount. For booking space, contact: Mr. Raju Gandhi INSITE, Exhibition Organiser, 18, 1st Floor, Empire Tower Nr. Associated Petrol Pump, C.G.Road, Ahmedabad-380 006 Tel: 079-6449837, 6562080, Fax: 079-6449301 E-mail : insite_guj@hotmail.com.

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Dairy Tech: , 2001, November, 12-15, 2001 at China International Exhibition Centre, Beijing, China.

The above China International Dairy Products & Technology Exhibition is being organised by Messe Dueseldorf Asia.

The Exhibitor profile includes: Dairy products processing machinery, Monitoring and testing equipment, Filling and packaging equipment, Printing equipment, Refrigerating & storage, Fresh keeping and transportation. Products include Milk & milk products, powdered milk, cream, ice cream and other cream products, cheese, casein, coloserums, whey powder,etc.

Interested persons may contact:- Xavier Rebello, General Manager, Indo German Chamber of Commerce, Ist Floor, Cuffe Parade, Mumbai-400005 P.O.Box No. 11092, Mumbai-400020. Tel : 022-2186131 (9 Lines) Fax No. 022-2180523 E-mail. Xavier@indo-german.net.

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19th International Fair, February 2002, Khartoum, Sudan

India Trade Promotion Organisation is organising the above 19th International Fair in Sudan. In the earlier fair, where 23 Indian companies participated business finalised was reported to be Rs. 42.00 Crores, out of which, Rs. 10.15 crores was finalised on the spot and business under negotiation was Rs. 31.85 crores.

Interested parties may contact :Mr. B.M.Tandon, General Manager, ITPO, Pragati Maidan, New Delhi - 110001. Tel: - 3318143, Fax: - 3320855, 3317896, Telex : 031-61022, 03161311 comxh in 031-65155 adep incable: comexh.

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Asia-Invest Programme

The Asia-Invest Programme is a European Community initiative that provides financial support to facilitate business co-operation between companies from the European Union and Asia. Several Asia-Invest events are organised in different Asian countries from time to time, the details of which are published in their Newsletter, "Asia-Invest News". Copies of the same can be obtained free-of charge from the Asia-Invest Securetariat.

Organisations interested in applying for funding under the programme about the new calls or any of the Asia-Invest events can contact:-

Asia-Invest Secretariat
Ruc Archinede/Archinedesstraat, 17
D-1000, Drussels, Delgium
Tel : +3222821750
Fax :+ 3222821760
E-mail: asia.invest@asia-invest.com

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Rural Technology Demonstration Programme on Food & Fruit Processing at Kurnool.

The CSIR-Polytechnology Transfer Centre (PTC), Hyderabad in association with CFTRI Regional Centre Hyderabad & UNDP-Kurnool organized a 2-day programme to demonstrate methods of preparation of tomato ketchup, squashes, jams, RTS drinks, energy foods, potato chips etc to participants of self help, DWCRA groups, etc. Latest technologies in processing, packaging, preservation, machinery, etc were explained to about 40 women enterpreners attending the Demonstration Programme.

CSIR News *30 April 2001*

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Training Programme at CFTRI

CFTRI, Mysore is organising two short term courses given below: -

1. **Appropriate Technologies of Fruit & Vegetable products from Farm to Consumer chain, October 8-19, 2001.**

2. **Newer trends in postharvest handling of Fruits & Vegetables - a paradigm shift, Oct 22 to Nov 2, 2001.**

The courses will cover a wide range of topics on the themes.

Training fee Per course	:	Rs. 6750/-
Boarding	:	Rs. 3250/- (optional)
Total charges Per participant per course	:	10,000/-

Interested persons may contact :
Head, HRD
CFTRI, Mysore.
Ph : 0821 - 514760
Fax : 0821 - 517233

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GOVT. CIRCULARS

GOVERNMENT OF INDIA/BHARAT SARKAR
MINISTRY OF LABOUR/SHRAM MANTRALAYA

New Delhi, Dated May, 2001

NOTIFICATION

G.S.R. In exercise of the powers conferred by section 5, read with sub-section (1) of section 7 of the Employees Provident Funds and Miscellaneous Provision Acts, 1952 (19 of 1952) the Central Government hereby makes the following Scheme further to amend the Employees' Provident Fund Scheme, 1952, namely:-

1 (1) This Scheme may be called the Employees' Provident Fund (Amendment) Scheme, 2001

(2) It shall come into force on and from the 1st June 2001

2 In the Employees' Provident Fund Scheme, 1952

(i) In sub-clause(ii) of clause (f) of paragraph 2, for the words" five thousand rupees" the words "six thousand and five hundred rupees" shall be substituted;

(ii) In sub-paragraph 6 of paragraph 26 , for the words" rupees five thousand" the words" rupees six thousand and five hundred" shall be substituted;

(iii) In the proviso to sub-paragraph (2) of paragraph 26-A, for the words "five thousand rupees", wherever they occur, the words "six thousand and five hundred rupees" shall be substituted.

sd/-
(J.P. PATI)
Joint Secretary to the Government of India

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PRESS INFORMATION BUREAU,
GOVERNMENT OF INDIA
PFA AMENDMENT ON IRRADIATED FOODS

New Delhi, Vaisakha 26,1923
May 16, 2001

The Government has amended the Prevention of Food Adulteration (PFA) Rules, 1955 relating to irradiated foods.

In the case of irradiated foods, maximum and overall average dose of irradiation that will be permissible for products like frozen fresh and dried sea foods, as well as for pulses have been prescribed. Similar standards are already available for products like onions, spices and potatoes. There are a number of requirements for undertaking the process of irradiation under the PFA Rules and these are in line with the provisions of the Atomic Energy (Control of Irradiation of food) Rules, 1991 and are to be undertaken in facilities approved and licensed under these Rules.

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SPURIOUS GOODS TO COME UNDER THE CONSUMER ACT

The proposed Consumer Protection 9Amendment) Bill 2001 would bring manufacture and /or sale of spurious goods within the purview of the Consumer Protection Act by treating such action as unfair practices. Some other amendments in the proposed bill include provisions to charge fee in respect of complaints filed before the consumer disputes redressal agencies. It further provides for exclusion of services availed for commercial purposes and those in respect of which an alternative remedy is available under another statute from the purview of the redressal agencies and restricting engagement of legal practitioner by the opposite party.

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PRESS INFORMATION BUREAU
GOVERNMENT OF INDIA

STATES TO INTRODUCE VALUE ADDED TAX FROM APRIL 2001.

New Delhi: Asadha 14, 1923
July 5, 2001.

Union Finance Minister, Shri Yashwant Sinha presided over the Chief Ministers/Finance Ministers' Conference on Value Added Tax, held here today. The following decisions were taken at the Conference.

1. The conference accepts and adopts the report of the Empowered Committee of State Finance Ministers for introduction of VAT w.e.f. 1st April, 2001. The Conference also accepts the VAT design recommended by the Committee including the use of PAN as the Common Business Identifier.

Special Category States and newly formed States, would have an option to introduce the VAT regime by 1st April, 2003.

However, there should be no further delay in the implementation of uniform floor rates and all States and UTs should comply fully in the implementation of these rates by 31st July, 2001. The Conference noted that in the event of any State/UT not complying with the regime of floor rates, Government of India would be taking steps to withhold Central assistance and grants to such non-complying States/UTs. Similar action will be taken if any State or Union Territory does not withdraw sales tax incentives for industries by 31st July, 2001.

2. A Committee of State Finance Secretaries and Finance Ministry officials would develop clear and measurable criteria for judging revenue loss, if any, due to introduction of VAT and would recommend the manner of compensation as well as the extent/quantum.

3. The issue of levy of VAT on services would need to be studied further. Finance Ministry along with State Finance Secretaries would, taking into consideration the Govinda Rao and Partha Shome Reports, examine the feasibility and modalities of these suggestions and submit a report by 30th September, 2001. The levy of VAT on imports and commodities under AED would be examined separately by Government of India. These will not be a pre-condition for introduction of VAT.

4. State Finance Secretaries would supervise training and computerisation in the States for the purpose of introduction of VAT. Assistance will be rendered to the States/UTs by Government of India, modalities of which will be finalised in consultation with the Empowered Committee of State Finance Ministers.

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AFST (I), Delhi chapter announces holding of a National Seminar on **"Globalisation-Impact on Indian Food Processing Industry"** on 19th October 2001 at New Delhi.

Eminent speakers will be presenting papers on different aspects of the theme.
Nominal Delegate fee of Rs 100/- per head has been fixed.

Interested persons may contact :

Hony. Secretary
ASFT(I), Delhi Chapter
206, Aurobindo Place Mkt. Complex
Hauz Khas, New Delhi -110 016
Telefax :011-6510860

APEDA NEWS

APEDA AWARDS FOR OUTSTANDING PERFORMANCE FOR THE YEAR 2000-2001.

Dear Exporter,

APEDA proposes to award various categories fo exporters for outstanding performance in the various fields. Details for APEDA Award for the year 2000-2001 are invited from exporters for outstanding performance in the field of exports of scheduled products including export promotion, market and product development, research and development, packaging and quality.

It is requested that this may be circulated to the members of your Association and submitted in duplicate to the undersigned by 16th July, 2001.

Yours faithfully.
(Sqn. Ldr. D.B.Sabharwall)
Secretary.

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Details for Awardsof Trophy/ Certificate of Merit for Outstanding Export Performance for the year 2000-2001.

(The details to be provided by the exporter/manufacturer)

1. Name of the firm and year of establishment.
2. Correspondence Address along with, Telephone No, Fax Nos. e.mail etc.
3. Whether the firm is a SSI Unit, please mention Registration no. and validity.
4. Manufacturing activities of the firm

   a) Exclusively/substantially for export.
5. Export activities of the firm in Agricultural products.
6. Nature of the organization- Public limited/Private Ltd. / Partnership, etc.
7. Is the firm recognized as Export House/ Trading House/ Star Trading House? Please give recognition No. and validity.
8. Whether merchant exporter or manufacturer exporter.
9. APEDA Registration No.
10. Special efforts put in by the exporters in the field of

    a) Exports
    b) Export Promotion
    c) Product Development
    d) Market Development
    e) Research and Development
    f) Packaging
    g) Quality

11. Firm's exports during last three years.

a) For the products faling under APEDA Schedule

Products/ITS (HS) Code	Firm's Exports in FOB Value (Rs/Crores)			Yearwise percentage growth over preceding year	
	1998-99	1999-2000	2000-2001	1999-2000	2000-2001

b) Other products exported by the firm

Products/ITS (HS) Code	Firm's Exports in FOB Value (Rs/Crores)			Yearwise percentage growth over preceding year	
	1998-99	1999-2000	2000-2001	1999-2000	2000-2001

c) Total exports of the firm (total of (a) and (b) above)

Products /ITS (HS) Code	Firm's Exports in FOB Value (Rs/Crores)			Yearwise percentage growth over preceding year	
	1998-99	1999-2000	2000-2001	1999-2000	2000-2001

d) Country wise break up of total exports during the last 3 financial years

Country	FOB Value (Rs/Crores)		
	1998-99	1999-2000	2000-2001

12. Details of export promotion efforts during 2000-2001 with reference to the following:

    a) Development of a new product and exports to new markets known to be difficult for accessibility to Indian goods;

    b) Demonstrable success in the last 3 years in assisting exports from India of products of small scale industries and cottage industries.

    c) Significant success in developing or acquiring internationally accepted standards of quality.

    d) Significant success in establishment/promotion of India brands abroad

13. Details of trade disputes or arbitration proceedings, if any, during last three years (give particulars of party in dispute, commodity, the mediation party and the result).

14. Indicate the year the type of awards received from the APEDA, Ministry of Commerce & Industry, Govt. of India, during the last five years.

(Signature with name, date and stamp)

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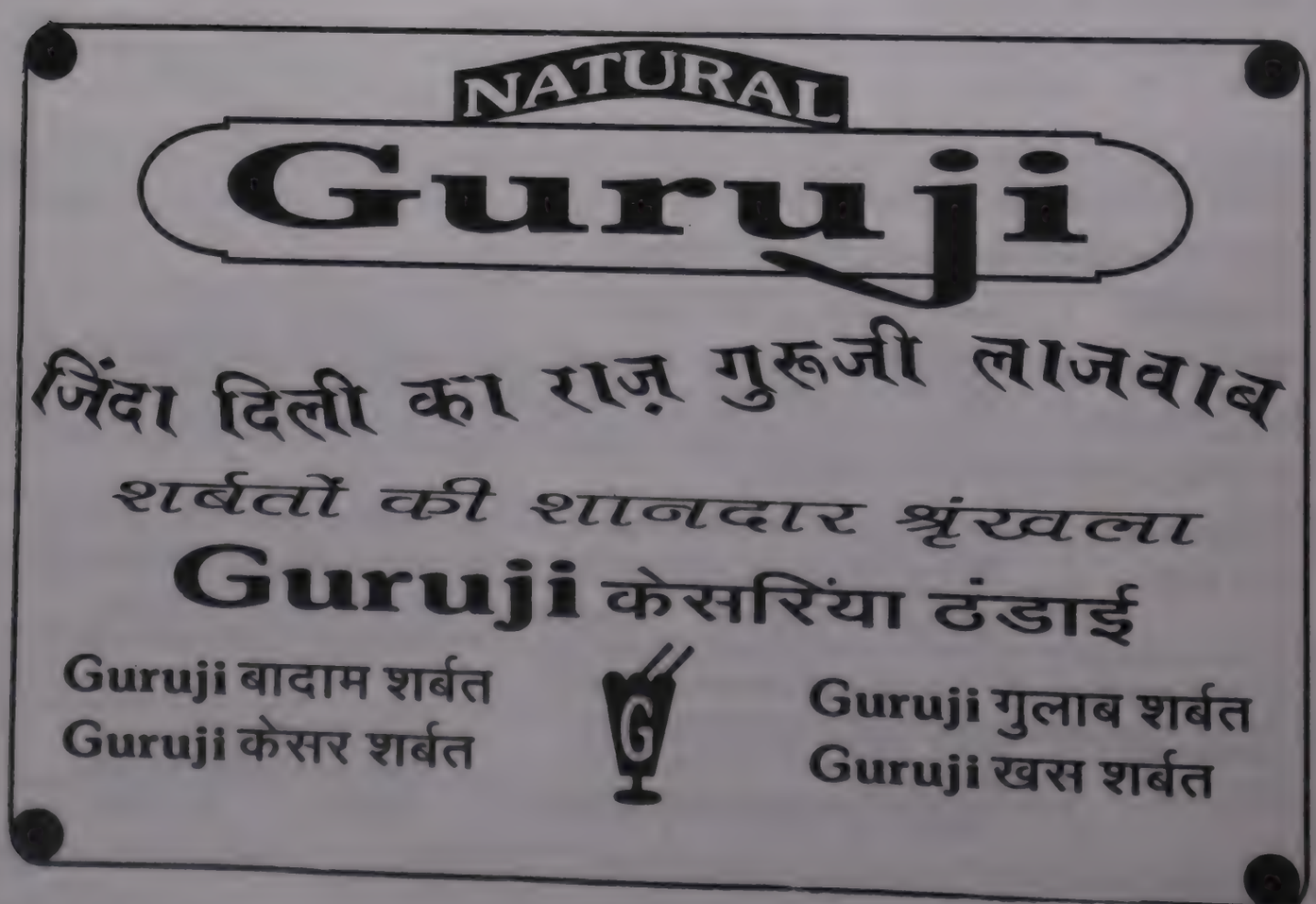

NEW PRODUCTS

Ultra low Oxygen Cold Stores launched to reduce Wastage

Made by Frick India.

- ULO cold stores allow longer storage periods for fruits and vegetables.
- Priced between Rs 50,000 and 3 crore depending on capacity.

Frick India Ltd, a leading refrigeration and air conditioning company, has launched its ultra low oxygen (ULO) cold stores, that can help reduce the wastage of crops and produce.

The ULO cold stores allow for storage of fruits and vegetables for longer periods than current cold stores are capable of. They also permit better preservation of the basic colour, a firmer product and ethylene sensibility and decrease of decay sensibility. The cold stores are priced between Rs 50,000 and Rs 3 crore depending on the capacity of the units.

India, which is the second largest producer of fruits and vegetables, loses about 30 to 40 per cent of its harvest due to inadequate storage infrastructure. Shortage of quality storage facility also undermines its potential for exports.

Indian Food Industry May-June 2001

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A New Sensor to identify Rotten Potatoes

- Developed at University of the West of England.
- The sensor detects odorous organic compounds released due to bacterial soft rot.
- Useful for early detection of soft rot in commercial potato storage facilities.

A new way of identifying rotten potatoes by using a sensor while in storage could save an estimated $5.7 million. The sensor developed by a team of physicists at the University of the West of England, in Bristol, is used to detect organic compounds in the air space around the potato tubers indicating an infection in the vegetables.

Bacterial soft rot, caused mainly by the bacterium, *Erwinia carotovora*, is a major problem in the bulk storage of many vegetable crops. Under favourable conditions, the bacteria can change infected potato into wet, rotten tissue, which quickly infects surrounding tubers and spreads the infection rapidly. Bacterial infection of this type is accompanied by an increase in the concentration of odorous organic compounds in the air space above the tubers and it is these gases that the sensor sniffs out to detect the rot.

The sensor-based on ceramic materials- showed a high sensitivity to the organic vapours and an added bonus is that they are also relatively inexpensive. Using their experimental results, the researchers used the best performance sensors to make a prototype detector which was able to detect one infected tuber in 100 kilograms (approximately 900 potatoes). It is envisaged that this prototype system could be used for the early detection of soft rot in commercial potato storage facilities.

Indian Food Industry May - June 2001

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Astra develops new fruit drier

The Center of Application of Science and Technology for Rural Areas (Astra), part of the Indian Institute of Science (IISc), has developed a unique vegetable and fruit preservation drier which can preserve the produce in a dry form for over six months without preservatives.

The drier removes the moisture from the vegetable or fruit and leaves it in a dry form, which can be preserved in air-tight cellophane bags for long periods.

The drier is a cabinet chamber with brick walls and provision for trays in layers to keep vegetables

or fruits in their original form. The structure's (the size can vary according to the intended volume of the produce sought to be dried) top, bottom and side provide the three heating surfaces which are attached with metal coils that are heated using biogas.

They explained that vegetables and fruits generally have 50 per cent to 70 per cent moisture which is gradually reduced at temperatures ranging from 60 to 70 degree Celsius, depending on the vegetable or fruit and the moisture content it has .

The time taken to complete the drying process differs from each vegetable or fruit as the moisture content varies among them. The temperature can be regulated with a dial attached to the temperature meter.

The dried produce can be preserved in powdered form in air-tight bags up to six months and still be consumed by just mixing water or milk before adding it to different dishes.

Processed Food Industry *April 2001.*

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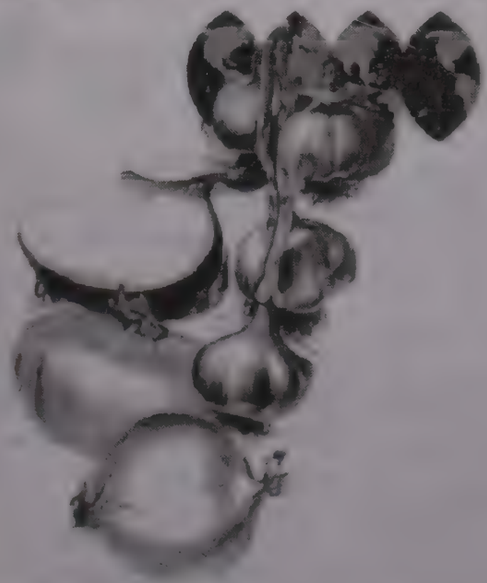
REVOLUTIONIZING TASTE AROUND THE WORLD



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- Dehy. Mint Leaves Powder
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- Dehy. Karela
- Dehy. Tomato Powder
- Dehy. Coriander Leaves
- Dehy. Coriander Powder
- Dehy. Onion Flakes White / Red
- Dehy. Onion Minced White / Red
- Dehy. Onion Kibbled White / Red
- Dehy. Onion Powder White / Red
- Dehy. Potato Cubes / Fingers
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- Dehy. Cabbage Powder
- Dehy. Green Chilli Powder
- Dehy. Spinach (Palak) Powder
- Dehy. Sweet Neem (Curry) Leaves
- Dehy. Sweet Neem (Curry) Powder
- Dehy. Kasuri Methi Leaves
- Dehy. Kasuri Methi Powder
- Dehy. Raw Mango (Amchur) Powder

Established in 1972 at Jamnagar, we are India's leading manufacturers and exporters of dehydrated spices and vegetables with National and International Awards for outstanding export performances.

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RESEARCH ARTICLES

PREPARATION OF POTATO FLOUR AND ITS QUALITY CHARACTERISTICS

R. S. Marwaha and S. K. Sandhu
Central Potato Research Station
Post bag No. 1, Jalandhar - 144 003, India

ABSTRACT

Potato flour was prepared from 11 Indian potato varieties by three different methods and yield recovery and sensory characteristics such as colour, flavour and taste were studied. Flour yield was found to be directly related with dry matter content of tubers. Pressure cooking the peeled whole potatoes followed by mashing, drying and grinding was the most effective method for the preparation of flour on a small scale. Flours prepared from all the varieties by the above method were of acceptable quality as they contained lower amounts of reducing sugars, free amino acids and total phenols. Based on sensory evaluation and yield recovery of flours, *Kufri Chandramukhi* and *Kufri Jawahar* were the most suitable varieties for the preparation of flour. Potato flour was found to be organoleptically acceptable up to 6 months of storage in sealed polythene bags at ambient temperature, while the quality remained unchanged for more than one year at -18°C.

INTRODUCTION

Potato production in India has been increasing steadily during the last fifty years and the total production during 1997-98 was 18 million tonnes. During the years of overproduction, there are slumps in the prices due to gluts often caused during harvest time which means economic loss to the growers and wastage of precious food. In order to avoid gluts and the consequent difficulty of storing large quantities of potatoes during period of extremely high temperature, the processing of potato is imperative (Marwaha, 1997). Processing also provides an effective means of utilizing surplus potatoes because it reduces waste and helps in decreasing the demand for refrigerated stores. Although, potato processing constitutes less than 1% of the total production, but the demand for processed potato products is likely to increase in India due to increased urbanization, preference of the new generation for fast food and picnic snacks, rising per capita income, increase in the number of working women preferring ready-cooked food and expanding tourist trade.

Among processed potato products, chips are most popular in India but they have short shelf life and their production involves sophisticated modern infrastructure, specific raw material requiremts and specialized packaging which make the cost prohibitive and only within the reach of rich urban class. Alternatively, potato flour is one such dehydrated product, which has less stringent raw material requirements and can be prepared from substandard potatoes which may be either too small, too large, cull or damaged. The technique for production of flour on the small scale is very simple and cheap which requires no costly machinery

and utilizes solar energy for drying and can be a cottage industry in rural areas (Sikka, 1998). Potato flour has a promising future due to its long shelf life and diverse uses. It can be used as a thickener-flavouring agent in soups, gravies, sauces and baby foods and also incorporated in the baking of bread to retain freshness. Besides this , it can also be used in preparing several home-made finished products such as *tikki, alu bhujiya, dosa* etc. Several value added products such as custard powder, soup thickener, biscuits, bread, cake and weaning food have been developed from different combinations of potato flour with potato starch and with other cereal products (Chandrasekhara and Shurpalekar, 1984a, 1984b; Gahlawat and Sehgal, 1988; Marwaha and Sandhu, 1999).

Although, on an industrial scale, potato flour is prepared by using continuous screw conveyor cooker and drying them on a drum dryer, but on a small scale it can be prepared either by blanching the slices followed by drying and grinding (Srivastav et al., 1973) or by boiling the potatoes in the pressure cooker followed by peeling and drying in the oven at 60°C (Pant and Kulshrestha, 1995). No information on the effect of different methods of preparation of flour on its yield recovery, sensory characteristics and losses during processing from different varieties is available. Recently, a number of new Indian varieties have been released which are very important from processing viewpoint and require immediate evaluation for flour. Keeping above specific objectives in view, the present investigation was undertaken.

MATERIALS AND METHODS

Eleven Indian potato varieties viz., *Kufri Badshah, Kufri Bahar, Kufri Chandramukhi, Kufri Dewa, Kufri Jyoti, Kufri Lalima, Kufri Lauvkar, Kufri Sindhuri*, including the three recetly released *Kufri Jawahar, Kufri Pukhraj and Kufri Sutlej* were grown at the Central Potato Research Station, Jalandhar during 1996-97. All the recommended cultural practices were followed and the crop was harvested at full maturity. Well cured tubers of uniform size (70-80g) of each cultivar stored at ambient temperature were used for the preparation of flour in the first week of April.

About 500g tubers of each cultivar were used and the flour was prepared by three methods: (1) Whole potatoes were pressure cooked for 10 min, followed by peeling, mashing and drying (TI), (2) Peeled whole potatoes were pressure cooked at 15 lbs PSI at 121°C for 10 min followed by mashing and drying (T2) and (3) Peeled potatoes were cut into slices of 3 mm thickness, blanched in boiling water for about 5 min, followed by drying T3. In T2 and T3 treatments, 0.25% sodium metabisulphite was added in the water to improve the colour of flour. In all the three treatments, the material was dried in an oven at 60°C for 30 hrs and was initially ground in a mixer grinder at high speed for about 5-10 min followed by grinding in a mill to make fine powder. It was then sieved through a fine muslin cloth. The dried flour contained a moisture content fo 8-10 percent. The flour was evaluated for colour, flavour and taste by a panel of five judges. For the determination of dry matter, tubers were cut into small pieces and oven dried at 70°C to a constant weight.

RESULTS AND DISCUSSION

Tuber dry matter content and flour yield : Dry matter content of the varieties varied between 15.7% (*Kufri Badshah*) to 20.2% (*Kufri Chandramukhi*) (Table 1). Although, *Kufri Chandramukhi* showed maximum dry matter content, but it was at par with *Kufri Jawahar* (20.1%). Large variations in the dry matter content of varieties are reported earlier (Marwaha, 1999).

Dry matter content of tubers is the most important factor in determining the suitablility of potatoes for processing as it is posititively correlated with the yield of the dehydrated products (Grewal and Uppal, 1989). Potatoes with high dry matter content and low reducing sugars are considered suitable to ensure yield of good quality processed products (Marwaha, 1997;Gaur et al., 1999).

In the present investigation also, it was observed that, *Kufri Chandramukhi* and *Kufri Jawahar*, both having highest dry matter content produced maximum flour yield, while *Kufri Badshah* with lowest dry matter content gave minimum flour yield , while *Kufri Badshah* with lowest dry matter content gave minimum flour yield by TI and T2 treatments (Table 1). Pant and Kulshrestha (1995) also reported maximum yield of flour from JH 222 which is now released as variety *Kufri Jawahar*.

There were large variations in the recovery of flours from different varieties by the three methods. The mean recovery of flour on fresh weight basis was 15.7, 14.8 and 12.7% in TI, T2 and T3 treatments, respectively (Table 1). Likewise, the average flour recovery on dry weight basis was also maximum in T1 (86.6%)followed by T2 (81.8%) and T3 (71.1%). The lower recovery in T2 and T3 treatments was due to high peeling losses as well additional loss of soluble constituents due to leaching during blanching of slices in T3 treatment.

Sensory characteristics of flours: Flours prepared from tubers of all the varieties by T1 treatment were brown to dark brown in colour with unpleasant flavour and taste and were of poor quality which were unacceptable. This was mainly due to the presence of high levels of reducing sugars and phenolic compounds resulting in non-enzymatic browning and after cooking discoloration in the product turning it into poor quality. On the other hand, flours prepared from all the varieties by T2 and T3 treatments had good colour, flavour and taste and were acceptable. While, flours made from all the other verities were cream to light yellow in colour, *Kufri Pukhraj* produced flour of golden yellow colour. Flour from *Kufri Jyoti* although, acceptable but was not so attractive in appearance.

Processing losses during preparation of flours : Average peeling and trimming losses of tubers were very high in T2 and T3 treatments (13.6% and 13.5%) as compared to T1 (2.9%) (Table1). Low peel loss in T1 treatment was due to the fact that the skin of boiled potatoes was removed easily, while in T2 and T3 treatments, peeling and trimming of raw potatoes removed a part of cortex tissue beneath the skin leading to high losses. There were large differences in the processing losses among varieties. *Kufri Jyoti* in T1 teatment and *Kufri Sindhuri* in T2 and T3 treatments showed maximum losses during peeling and trimming operation (Table 1). The highest losses in variety *Kufri Sindhuri* in T2 and T3 treatments were due to the shape of the tubers having deep sunken eyes.

Sugar, free amino acid and total phenol content of tubers and flours in relation to quality : Sugar content of potato tubers is of great importance in relation to processing, especially for fried products. The colour of the finished product is dependent upon the reaction between reducing sugars and free amino acids. It is reported that the content of reducing sugars above 0.5% in the fresh potatoes resulted in brown discoloration of dehydrated products . (Lisinska, 1989). The reducing sugar content of the tubers varied between 1.42 (*Kufri Chandramukhi*) to 2.55% (*Kufri Lalima*) on dry weight basis (Table 2). However, when converted on fresh weight basis, tubers of all the varieties contained less than 0.5% reducing sugars. The reducing sugar content of the flours from different varieties ranged from 1.01 (*Kufri Chandramukhi*) to 1.94% (*Kufri Lalima*) on dry weight basis. Similarly, the free amino acid contents of the flours were also quite lower in comparison to tubers (Table 2). This was due to losses in reducing sugars and free amino acids during different steps of processing, such as peeling and blanching, which averaged about 25% and 50%, respectively. Due to the presence of lower contents of reducing sugars and free amino acids in the flours, the quality of flours prepared from all the varieties by T2 and T3 treatments was acceptable.

Total phenol content of the tubers of different varieties ranged between 116 to 253 mg/100g dry wt, while the content in the flours varied between 44 (*Kufri Jawahar*) to 78 mg/100g dry wt (Table 2). The main loss of phenols during processing of potatoes into flour

was about 65%. Potatoes containing low amounts of phenols are most desirable from processing viewpoint, as these are responsible for enzymic discoloration (Schaller and Amberger, 1974). In our experiments, the tubers of *Kufri Jyoti* showed enzymic discolaration during peeling and slicing operations, which also contained maximum amounts of total phenols. However, the problem was overcome by soaking and blanching the peeled potatoes in water containing 0.25% sodium metabisulphite.

Storage studies on flours : Flours prepared from different varieties were sealed in the polythene bags and stored at ambient temperature and at -18°C. The flour was found to be organoleptically acceptable up to 6 months of storage at ambient temprerature, while the quality remained unchanged for more than one year at -18°C.

The results showed that, although, maximum yield of flour was obtained in TI treatment, it was not a suitable method since it resulted in inferior quality flour. Both T2 and T3 treatments produced good quality flours with a mean reduction in yield by 0.9% and 3.0%, respectively, when compared to T1. Thus, T2 treatment i.e.pressure cooking the peeled whole potatoes followed by mashing, drying and grinding was the most effective method on a small scale. The study demonstrated that *Kufri Chandramukhi* and *Kufri Jawahar* were the most suitable varieties for the production of flour.

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Table 1 : Tuber dry matter content, processing losses and recovery of potato flour during different methods of preparation.

Cultivar	Dry Matter (%)	Treatment	Peeling and trimming losses (%)	Flour recovery on fresh wt basis (%)	Flour recovery on dry wt basis (%)
Kufri Badshah	15.7	T1	1.7	13.5	86.0
		T2	13.7	12.9	82.2
		T3	13.5	12.3	78.3
Kufri Bahar	17.3	T1	2.3	16.5	95.4
		T2	14.1	14.3	82.7
		T3	13.9	13.6	78.6
Kufri Chandramukhi	20.2	T1	2.4	18.2	90.1
		T2	13.6	16.5	81.7
		T3	13.9	11.1	55.0
Kufri Dewa	18.9	T1	2.4	16.7	88.4
		T2	15.6	16.0	84.7
		T3	15.1	13.8	76.2
Kufri Jawahar	20.1	T1	2.1	18.1	90.0
		T2	13.3	16.5	82.1
		T3	13.2	14.6	72.6
Kufri Jyoti	17.4	T1	6.3	13.2	75.9
		T2	13.8	13.1	75.3
		T3	13.5	11.1	63.8
Kufri Lalima	18.5	T1	1.7	17.0	91.2
		T2	12.8	16.1	87.0
		T3	12.8	14.4	77.8
Kufri Lauvkar	19.7	T1	3.6	15.0	76.1
		T2	9.7	14.1	71.6
		T3	9.4	11.7	59.4
Kufri Pukharj	17.1	T1	4.1	13.7	86.2
		T2	15.0	13.3	83.6
		T3	14.8	12.7	79.9
Kufri Sindhuri	17.1	T1	1.9	14.2	83.0
		T2	16.2	14.1	82.5
		T3	16.0	11.1	64.9
Kufri Sutlej	18.7	T1	3.7	16.8	89.8
		T2	12.6	16.2	86.6
		T3	12.8	14.1	75.4
Mean	18.3	T1	2.9	15.7	86.6
		T2	13.6	14.8	81.8
		T3	13.5	12.7	71.1

T1= Whole potatoes pressure cooked followed by peeling, mashing and drying
T2= Peeled whole potatoes pressure cooked followed by mashing and drying
T3= Peeled potaotes cut into slices of 3 mm thickness, blanched and dried.

Table 2 : Chemical composition of tubers and flours of different varieties

Cultivar	Reducing sugar (% dry wt)		Free amino acid (mg N/100g dry wt)		Total phenol (mg/100 g dry wt)	
	Tuber	Flour	Tuber	Flour	Tuber	Flour
Kufri Badshah	*1.86*	*1.38*	*188*	*79*	*209*	*73*
Kufri Bahar	*1.78*	*1.35*	*196*	*88*	*194*	*66*
Kufri Chandramukhi	*1.42*	*1.01*	*277*	*108*	*183*	*68*
Kufri Dewa	*2.28*	*1.64*	*192*	*94*	*174*	*57*
Kufri Jawahar	*2.38*	*1.86*	*191*	*101*	*116*	*44*
Kufri Jyoti	*1.76*	*1.28*	*215*	*115*	*253*	*78*
Kufri Lalima	*2.55*	*1.94*	*286*	*163*	*219*	*74*
Kufri Lauvkar	*1.49*	*1.21*	*243*	*127*	*173*	*66*
Kufri Pukhraj	*2.45*	*1.93*	*285*	*160*	*190*	*61*
Kufri Sindhuri	*2.42*	*1.87*	*183*	*110*	*188*	*68*
Kufri Sutlej	*2.30*	*1.59*	*263*	*137*	*196*	*69*
Mean	2.06	1.55	232	117	190	66
CD (<0.05)	0.16	0.12	14	8	12	7

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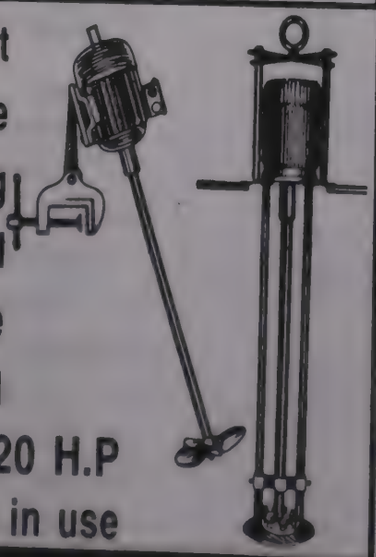
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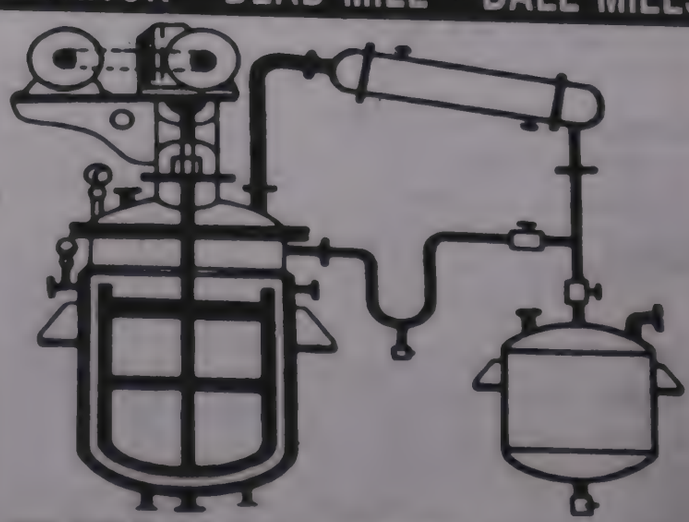
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ZERO-ENERGY-COOL-CHAMBER STORAGE STUDIES ON MANGO

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ABSTRACT

Physiological loss in weight, rotting, loss in vitamin 'C' and increase in total sugars were considerably less in *Langra* mango fruits stored under zero-energy-cool-chamber as compared to those stored at room temperature. Under zero-energy-cool-chamber, the fruits can be stored up to 10 days with acceptable minimum rotting and quality loss, as against 5 days at room temperature.

INTRODUCTION

Mango (*Mangifera indica L.*) fruits, like most of the other fruits are highly perishable in nature. Each year a considerable proportion of mango fruits are lost through spoilage in our country. This loss is due to the short storage life, rapid ripening process and faulty systems of storage. Mango, being prone to chilling injury, a serious physiological disorder in tropical and sub-tropical fruits upon storage at less than 10-13°C temperature, cannot be stored in cool storage (4±1°C). Cool storage facilities are not generally available near production centres. Moreover, the cool storage facilities being expensive and constrained by electricity shortage cannot be made available to accommodate all perishables. On the other hand zero-energy -cool-chamber (ZECC), designed by Roy and Khurdiya[5], can easily be installed at the production site with minimum expenses and it does not require any artificial energy to run. This storage system is particularly useful for short-term storage of fruits and vegetables immediately after harvest since temperature inside the chamber is always lower than room temperature and relative humidity higher. Naik[3] observed delayed ripening, shrivelling, lower incidences of microbial spoilage and physiological loss in weight (PLW) in *Alphonso* mango fruits in cool chamber as compared to room temperature. Therefore, present study was undertaken to evaluate the extent of shelf life of *Langra* cultivar of mango fruits in ZECC.

MATERIALS AND METHODS

Ten kilograms of *Langra* cultivar mango fruits were washed with tap water and air-dried. Half of the fruits were stored in ZECC (27.4° and 25.3° C max. and min. temperature; 89.6% RH) and the other half were packed in ventilated polyethylene bags (Size 45 x 20 cm; thickness 200 gauge; perforation 3 per cent) and stored at room temperature 36.1°C and 27.1° C max. and min. temperature; 53.8% RH) for comparison. The PLW of fruits was calculated on the basis of number of spoiled fruits out of total fruits at 5 days interval. Representative samples were taken from each unit by cutting a slice of mesocarp and homogenizing it in a blender. From this, biochemical estimations were carried out. Total solube solids (TSS) were measured using a hand refracto-meter and values corrected to 20°C. Total tiratable acidity and ascorbic acid contents were determined by titrometric methods as described by Ranganna[4] and the total sugar content was determined by colorimetric method using Anthrone reagent[6].

RESULTS AND DISCUSSION

Changes in terms of fruit weight, spoilage, total sugars, ascorbic acid, TSS and acid content during storage of mango fruits under ambient condition and inside ZECC were compared. It is clear from the Fig. I that PLW increased during storage of fruits under both the conditions. The PLW was much higher at room

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temperature and atmospheric relative humidity. Higher rate of transpiration at ambient condition due to higher temperature and lower RH as compared to ZECC are mainly responsible for higher PLW at room temperature. It is also evident from Fig. I, that no rotting was observed in fruits up to 5 days of storage and thereafter, it increased continuously. Rotting was more at room temperature as compared to those in ZECC. The fungi responsible for rotting were *Aspergillus niger, Diplodia natalensis and Penecillium islandicum.*

TSS and total sugar content increased while acidity and ascorbic acid content decreased continuously during storage of fruits under both the conditions (Table 1 and Fig.2), the changes being higher at room temperature.

Considering 10% PLW, a parameter for economic shelf life of fruits, as suggested by Dalal and Subramanyan[1], the *Langra* cultivar of mango can be stored up to 10 days under ZECC. Earlier reports also support the present findings that fruits stored under ZECC have longer shelf life due to less PLW, decay and better retention of original vitamin 'C', total sugars, TSS and acid content [2,3,7]. Better storage life of mango fruits under ZECC is mainly due to low rate of transpiration and slower biochemical changes because of prevailing low temperature and high relative humidity.

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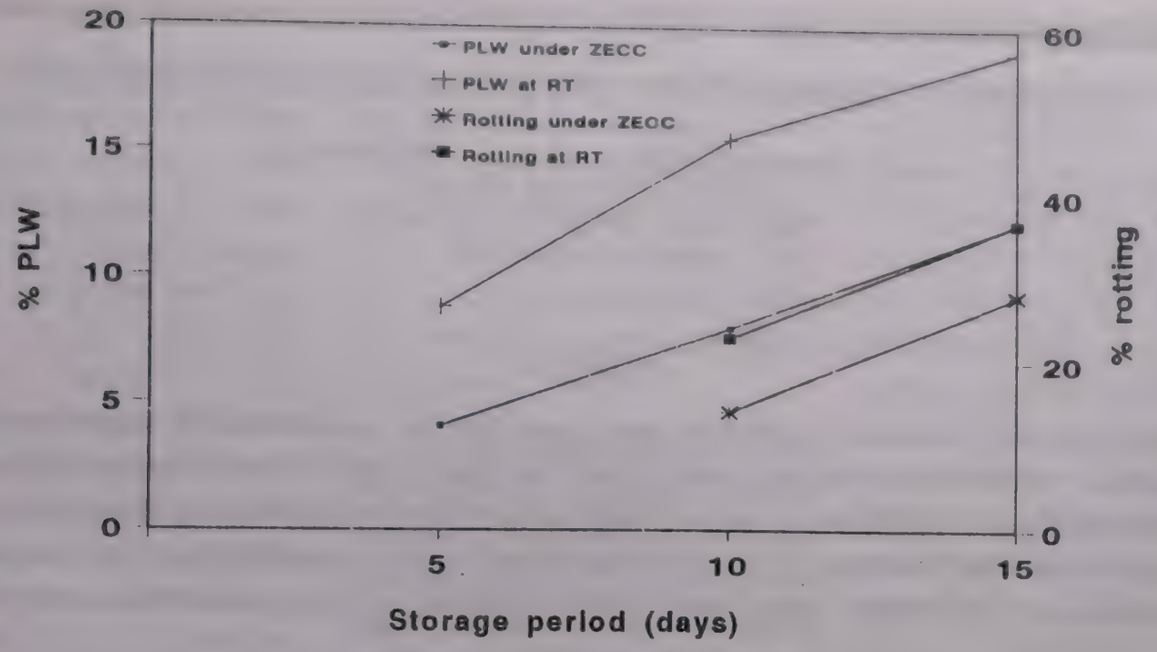
Table-1 : Changes in TSS and acidity of mango fruits during storage

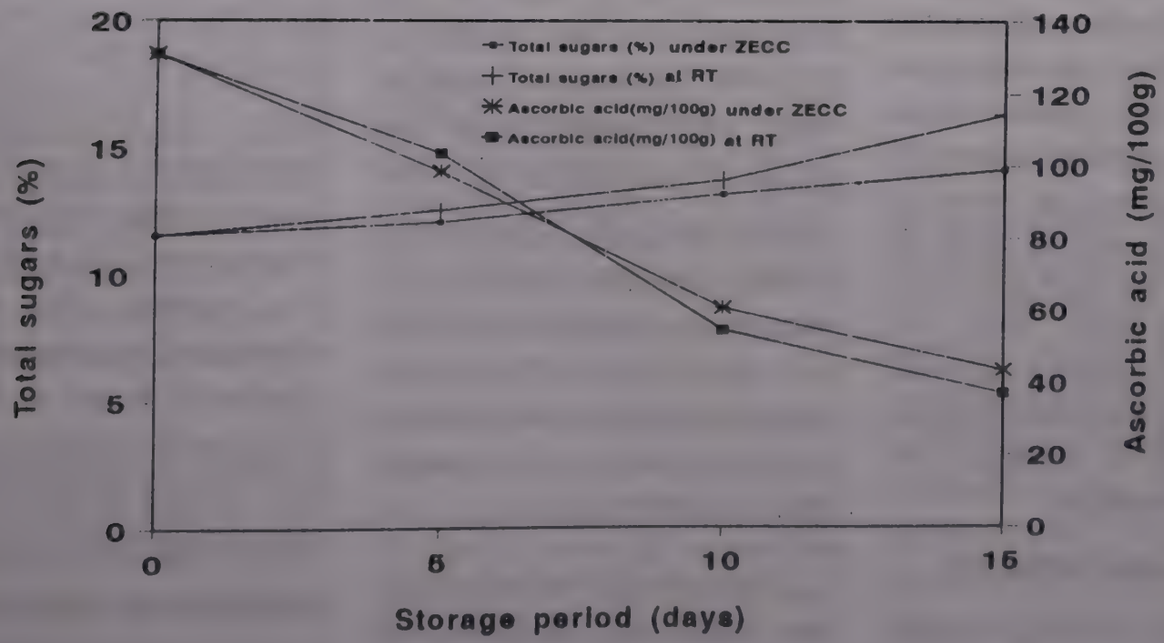
Storage Condition	Storage period(days) 0	5	10	15
	TSS (° Brix)			
ZECC	13.75	14.31	15.14	16.58
AT	13.75	17.32	18.83	22.34
CD(5% level)	-	0.05	0.04	0.11
	Acidity (% malic acid)			
ZECC	0.30	0.27	0.21	0.17
AT	0.30	0.24	0.17	0.12
CD(5% level)	-	0.019	0.013	0.006

ZECC-Zero-energy-cool-chamber
AT-Ambient temperature



C.D. (5%) : (1) PLW - 5 days = 0.12; 10 days = 0.29; 15 days = 0.43
(2) Rotting-10 days = 0.21; 15 days = 1.03

Fig. 1. Changes in physiological loss in weight and rotting during storage of mango (Langra) fruits



C.D. (5%) : (1) Total sugars - 5 days = 0.04; 10 days = 0.06; 15 days = 0.08
(2) Ascorbic acid - 5 days = 2.31; 10 days = 1.31; 15 days = 1.09

Fig. 2. Changes in total sugars and ascorbic acid during storage of mango (Langra) fruits

STORAGE BEHAVIOUR OF STRAWBERRY SAUCES

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ABSTRACT

***Sujatha* and *Labella* strawberry varieties were used for the preparation of sauce as per FPO specification. The prepared sauces were packed in glass bottles and polypropylene pouches and sealed airtight. The prepared sauces had reddish pink colour, strong flavour and highly acceptable taste. The changes in the chemical constituents, microbial load and organoleptic characteristics of the sauces were noted during storage at room temperature for 90 days.**

INTRODUCTION

Chutneys, sauces and pickles of various kinds are prepared by using fruits and vegetables for household purposes as well as for commercial scale. They find a ready market not only in India but also in many other countries. Standard receipes have been suitably modified to the acceptance of people in the country and other poarts of the world. The sauces should contain 3 per cent acetic acid (to ensure its keeping quality) and 15 to 30 per cent sugar according to the kind of sauce made from fruits and vegetables. An attempt has been made to prepare strawberry sauces and to check the storability and consumer acceptability

MATERIALS AND METHODS

Strawberry varieties namely *Sujatha* (V1) and *Labella* (V2) were purchased from the Maxworth Country (India) Limited,, Kodaikanal and used for this study. Mature, sound ripe fruits were selected, washed in clean water and surface dried. The calyx of the fruit was removed, pulped by using mixie. The fruit pulp was passed through the hand pulper to filter the debris. The sauce was prepared by mixing fruit pulp (300 g), sugar (67.5g), chilli powder (3 g) and salt (5.25 g) as per FPO specification(Siddappa, 1986). The prepared sauce was packed in glass bottles (C1) and polypropylene pouch (C2) and sealed air tight. The steps involved in the preparation of strawberry sauce are given in Figure 1. The storage behaviour of the sauce was observed by storing at room temperature (35°C and RH 75%).

The prepared strawberry sauces were reddish pink in colour with strong natural flavour. The taste of the sauce was highly acceptable like any other sauces prepared from fruits.

TSS (using hand refractometer), pH (Hart and Fischer 1971), total acidity (Ranganna, 1977), ascorbic acid (Mahadevan and Sridhar, 1982), reducing and total sugars (Ranganna, 1977), anthocyanin (Mancinelli et al., 1975) and microbial load (Istavankiss, 1984) of the strawberry sauce samples were determined periodically over a period of 3 months. The sauce samples were organoleptically evaluated by 10 untrained judges using hedonic scale ranging from 1 to 4 for lowest to the highest. The chemical constituents, microbial load and the organoleptic scores of the packed sauces were analysed once in 30 days. For the discussion the initial and the final values were taken.

RESULTS AND DISCUSSION

Chemical changes of the strawberry sauces : The changes noted in the chemical constituents are given in Table .1. A gradual increase in the acidity and a low

reduction in pH of the strawberry sauces packed in glass bottles and polypropylene pouches were observed during storage. The initial acidity of the strawberry sauces 1.00 and 1.02 g per cent had increased to 1.21 in V_1 C_1, 1.18 in V_1C_2 .19 in V_2C_1 and 1.17 in V_2C_2. Similarly the initial pH 5.40 decreased to 5.11 in V_2C_1, 5.16 in V_1C_2, 5.12 in V_2C_1, and V_2C_2 after 90 days of storage. The titratable acidity of the apple pomace sauce changed from 1.20 to 1.27 per cent after storing for 6 months at room temperature (Joshi et al., 1996).The kinnow products packed in flexible and rigid bottle and metallic containers showed a negligible change in pH during 24 weeks of storage at 12-39°C (Ranote et al., 1993).

Strawberry sauces exhibited only very slight increase in TSS (37-37.4° Brix) throughout the storage period in both the varieties packed in different packagiang materials (C_1 and C_2) . Similar trend was found in the apple pomace sauce (20 to 21.42°Brix) stored for 6 months at room temperature by Joshi et. al., (1996).

The reducing sugar content of sauces (V_1 and V_2) packed in C_1 and C_2 showed a gradual increase throughout the storage periods. The initial reducing sugar content of strawberry sauces were found to be 4.24 in V_1 and 4.25g per cent in V_2 which changed to 4.32 and 4.33 g%. A significant difference in the reducing sugar contents between varaties, packaging materials and storage periods was noted in the present study. The stored apple pomace sauce exhibited an increase in the reducing sugar content from 11.69 to 14.63 per cent when stored for 6 months at room temperature (Joshi et al., 1996).

The total sugar content of sauces were found to decrease in all the packaging materials in both the varieties (V_1 and V_2). The initial total sugar content of the strawberry sauces were 27.00 and 26.44 g per cent, which changed to 25.10, 25.02, 24.64 and 24.64 inV_1 C_1, V_1C_2, V_2C_1 and V_2C_2 respectively after storing for 90 days. Ranote et al. (1993) also reported that a decline in total sugar content of kinnow products packed in flexible pouch, can and bottle stored at room temperature.

Among the two strawberry sauces, the sauce prepared from *Labella* contained higher ascorbic acid content throughout the storage period than *Sujatha*. The sauces packed in glass bottles (C_1) exhibited a higher retention of ascorbic acid content than the samples packed in polypropylene pouch (C_2). The percentage loss of ascorbic acid content of the sauces packed in C_1 and C_2 ranged between 11.6 and 11.7 and 15.0 and 16.0 respectively in *Sujatha* and *Labella*. Ramasastri (1974) experienced a similar effect in stored *amla* powder.

The sauces prepared from *Sujatha* contained higher anthocyanin content as compared to *Labella* throughout the storage periods in both the packaging materials. The anothocyanin content of the sauces was found to be changed from 0.635 to 0.585 (in V_1) and 0.585 to 0.535 (in V_2). The percentage loss of anthocyanin content of the sauces ranged between 7.8 (in V_1) and 8.4 (in V_2). A significant difference in the retention of anthocyanin content was noted between varieties and storage period.

ii) Microbial load of the strawberry sauces : The microbial load of the sauce samples was analysed before and after storage. The sauces prepared from both the varieties recorded zero microbial count initially. After 90 days of storage, the samples V_1C_1, V_1C_2, V_2C_1 and V_2C_2 contained 3.0 and 4.0 x 10^6/g bacterial flora, 2.0 and 3.0 x 10^4/g fungal and 1.0 and 2.0 x 10^5/g yeasts in the sauces packed in bottles and polypropylene pouches respectively.

iii) Organoleptic Evaluation of the strawberry sauces : The strawberry sauces packed in different packaging materials were evaluated at regular intervals for the various quality attributes such as appearance and colour, flavour, taste and overall acceptability. The changes in the organoleptic score values of strawberry sauces during storage are given in Table 2. The products stored in bottles had recorded higher scores (90%) than the sauce stored in the polypropylene pouches (82%). Only

a slight difference in the score values was observed between varieties. The sauces prepared from *Sujata* and *Labella* strawberries packed in bottles and polypropylene pouches had maintained their consumer acceptability with very little changes in their chemical constituents during the study period.

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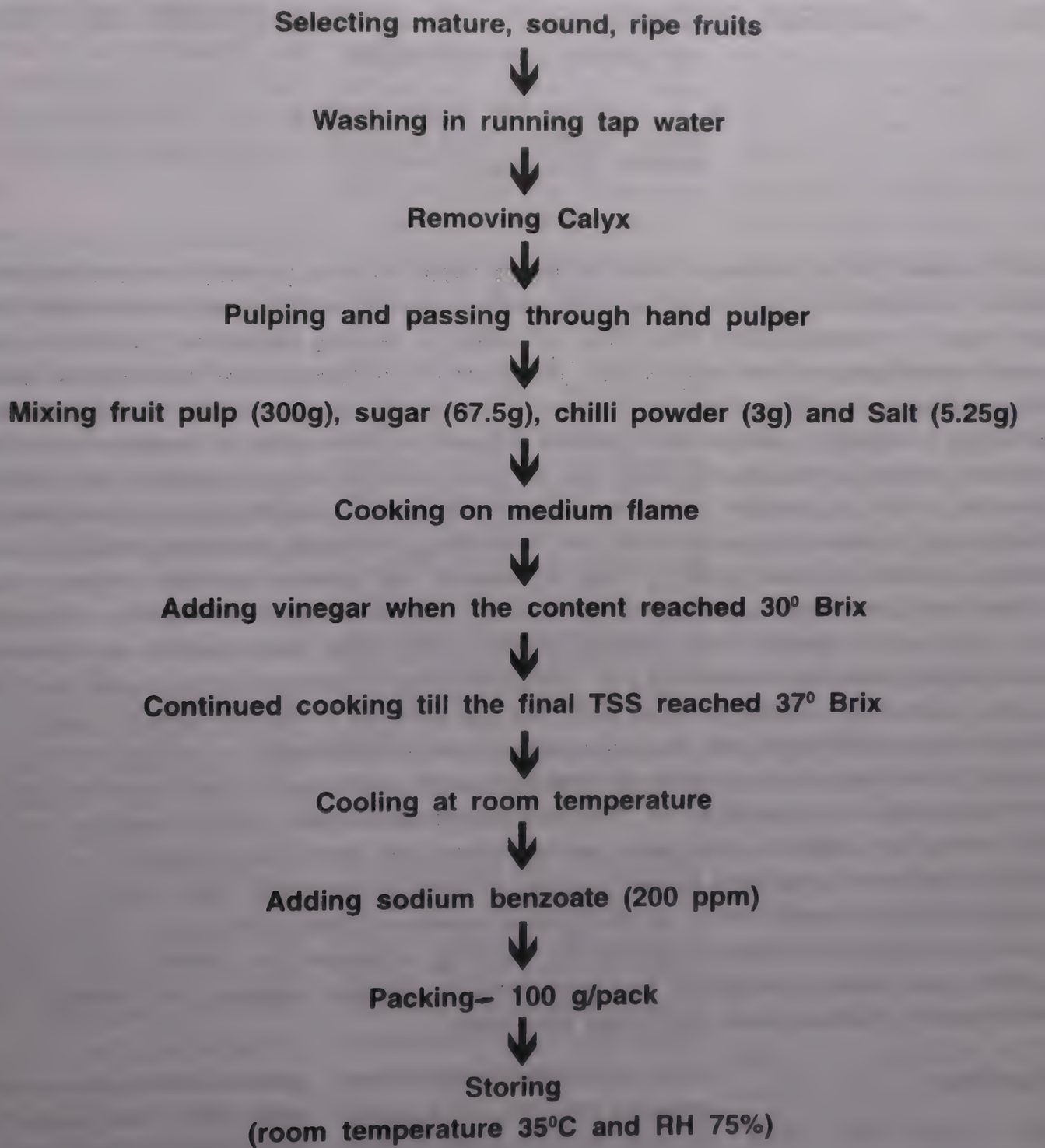
Table 1. Changes in the Chemical Constituents of Strawberry Sauces during storage

	TSS		Acidity		pH		Reducing Sugar (g%)		Total Sugar (g%)		Viatamin C (mg %)		Anthocyanin (A unit /g)	
Period of storage	Intial	Final	Initial	Final	Intial	Final	Intial	Final	Intial	Final	Intial	Final	Initial	Final
V_1C_1	37.2	37.5	1.00	1.21	5.40	5.11	4.24	4.32	27.00	25.10	18.00	15.90	0.635	0.585
V_1C_2	37.2	37.5	1.00	1.18	5.40	5.16	4.24	4.33	27.00	25.02	18.00	15.00	0.635	0.585
V_2C_1	37.0	37.4	1.02	1.19	5.40	5.12	4.25	4.33	26.44	26.44	21.60	19.20	0.585	0.535
V_2C_2	37.0	37.4	1.02	1.17	5.40	5.12	4.25	4.33	26.44	24.64	21.60	18.36	0.585	0.535

Table 2. Organoleptic Score Values of Starawberry Sacuces during Storage

Quality attributes	Sauce samples V1C1		V1C2		V2C1		V2C2	
	0 Day	90thDay	0 Day	90th Day	0day	90thDay	0day	90thDay
Appearance and Colour	4.0	3.6	4.0	3.3	4.0	3.5	4.0	3.3
Flavour	4.0	3.6	4.0	3.3	4.0	3.6	4.0	3.3
Taste	4.0	3.8	4.0	3.5	4.0	3.6	4.0	3.3
Overall acceptability	4.0	3.8	4.0	3.4	4.0	3.6	4.0	3.3

FIGURE 1. PREPARATION OF STRAWBERRY SAUCE


Selecting mature, sound, ripe fruits
Washing in running tap water
Removing Calyx
Pulping and passing through hand pulper
Mixing fruit pulp (300g), sugar (67.5g), chilli powder (3g) and Salt (5.25g)
Cooking on medium flame
Adding vinegar when the content reached 30⁰ Brix
Continued cooking till the final TSS reached 37⁰ Brix
Cooling at room temperature
Adding sodium benzoate (200 ppm)
Packing– 100 g/pack
Storing
(room temperature 35⁰C and RH 75%)

REVIEW ARTICLE

FIFTY YEARS OF RESEARCH AND DEVELOPMENT IN POST - HARVEST TECHNOLOGY OF CITRUS FRUITS IN INDIA– A CRITICAL REVIEW

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ABSTRACT

With increased citrus production over the last 50 years in India, problems concerning post-harvest management of fresh fruits assumed greater economic significance. Surveys reveal that total losses in mandarins and limes from harvesting to retailing range from 25-30% or even more in remote areas of the country. Both, producers and consumers are the losers as losses are monetary and nutritional besides wastage of resources/inputs invested in production and marketing. Lost produce can be made available at lesser cos. than cost of increasing production. Monetary benefits and fruit availability can be increa ed and losses minimized with orderly marketing which is possible only with implementation of sound pre- and post-harvest management practices viz. proper crop care, harvesting, treatments, packaging, transport and storage. Demand of these fruits is high in domestic and overseas markets. However, due to high water content and susceptibility to bruising, post-harvest life is reduced by shrinkage, decay and natural ageing. Under ambient condition these fruits have shelf life of 1-2 weeks which could be doubled or tripled by pre - and post-harvest treatments and increased manifold by low temperature. Grades of citrus fruit are not enforced in trade at present. Inspite of vast literature available on post -harvest treatments and standardization of storage conditions, handling by and large is on conventional lines. More work remains to be done in standardization of transportation of citrus fruits in domestic market. Mechanized sorting, washing, waxing and grading have gained acceptance among farmers and government agencies are taking initiative. Inspite of being sixth largest producer of citrus in the world, India's share in global trade is negligible. Research work on post-harvest aspects of citrus fruits grown in the country has direct bearing on devicing appropriate handling techniques for domestic and export marketing and hence, an attempt has been made to critically appraise the scientific and technological advances made during last fifty years.

INTRODUCTION

Area under citrus fruits especially mandarin (*Citrus reticulata Blanco*), Sweet orange (*Citrus sinensis Osbeck*) and acid lime (*Citrus aurantifolia Swingle*) have increased from 90 to 386 thousand ha and production from 823 to 2820 thousand tonnes during 1961 to 1992-93 (NHB, 1994) registering 7.8% annual growth during that period. In India citrus production ranks third in the country after mango and banana. India ranks sixth in the world in citrus production. Commercially grown lemons (*Citrus limon* (L) Burm F) have limited area

in Punjab, Haryana, Himachal Pradesh, Western Uttar Pradesh and North-East. Grapefruit (*Citrus paradisi Macf.*) and Pummelo (*Citrus grandis* (L) Osbeck) are grown in the backyards in north-eastern region and few orchards mostly in Punjab grow Kinnow, an introduced hybrid (King x Willow leaf) mandarin, which has become commercially important in North-West India during last few decades.

With increasing production and demand over the years it became imperative to preserve freshness and minimize losses of these fruits. Mandarins (peelable,loose jacketed) and sweet oranges (with firmly adhered peel) are used for table purpose. Limes and lemons are mostly used for garnishing salads and cooking besides manufacture of beverages as thirst quenchers. Citrus fruits are known to have laxative effect and other medicinal properties.

Citrus fruits mature and ripen slowly on the tree itself and prime quality has to be harvested in order to get desired taste, aroma and shelf life. Various pre - and post-harvest factors affect the eating and keeping quality of citrus fruits.Hence an attempt has been made to review Indian literature covering last fifty years on the subject. Review also aims to critically appraise the scientific and infrastructural advances made in this area so that future research and development activities can be planned.

Post-harvest losses : Wastage in citrus fruits was estimated up to 10% (DMI 1965). Survey revealed that losses of mandarins were more in rail transport and in summer season than in road transport and in winter (Biswas, 1969). In Coorg mandarins, nearly 3.5% of market arrival were discarded while another 37% were sorted and sold at 80% reduced rate. Assessment of losses in mandarins at various markets revealed that 17.1-18.36% fruits lost during marketing and cold storage at Delhi (Anonymous, 1991). In loosely transported Nagpur mandarin losses were 26% although 35% more fruit could be accomodated (DMI 1982). Survey of losses at Hissar and Delhi indicated that losses of mandarins(Nagpur mandarin and Kinnows) at wholesale and retail market levels were 5% and 15% respectively (Chauhan et al., 1987). Out of every 400 wooden boxes carried in the truck, 15-20 were extensively damaged crushing 15-25% of Nagpur mandarin fruits in those boxes (Ladaniya and Sonkar, 1996 a).

Pre - harvest factors affecting fruit keeping quality

Orchard health, tree nutrition and cultivation : Storage decay due to stem-end rots were less (1-4%) in Nagpur mandarin fruits from healthy trees than in fruits from neglected trees (8-69% decay) with 10-25% blighted twigs (Naqvi 1993).

Studies with graded doses of urea (0-800 g N/plant/yr) and farm yard manure indicated that decay and weight loss in Nagpur mandarins during ambient and refrigerated storage were on par in fruit grown on FYM alone (25 kg/plant/year) and fruit grown on chemical nitrogen through urea (600 g N + 200 g P + 100 g K/plant/yr) (Huchche et al. 1998). In Kagzi lime, 800 g N/plant/yr resulted in least weight loss and highest Vit. C content during storage at room temperature for 12 days (Prasad and Putcha 1979). Similarly in sweet orange cv. Mosambi higher doses (800-1200 g/tree) of nitrogen reduced storage decay and weight loss as compared with lower doses and control (Govind and Prasad 1981).

Pre-harvest sprays of 2,4-D (20 ppm) and Naphthalic acetic acid (10-100 ppm) one month before harvest increased juice content in Coorg mandarin (Rodrigues et al. 1963). In Nagpur mandarin, gibberellic acid (10 ppm) treatment (at colourbreak) improved fruit firmness, delayed colour development and puffiness and reduced fruit weight loss in storage.Treatment also helped in retaining fruit on the tree up to 4 weeks beyond normal harvest time (on-tree storage) without affecting subsequent crop (Ladaniya 1997 a). Calcium nitrate (1%) sprays have improved keeping quality of Kinnow mandarin by reducing decay (Bhullar et al. 1981). Activities of polymethylesterase and peroxidase enzymes reduced during storage of Kinnow treated with calcium compounds (Dhillon 1986). Combination of Calcium nitrate and Bavistin (0.1%) gave the best results by extending marketability of

Kinnow fruits up to 56 days at ambient conditions (Surinder Kumar and Chauhan 1989). Pre-harvest spray of Thiabendazole (500 ppm) was also effective in reducing post-harvest rot in Kinnow (Gupta et al. 1981b).

Fruit growth, physico-chemical changes and maturity indices : Citrus fruits of different species take different time to mature depending on soil and climate. Citrus trees in temperate to subtropical conditions of North flower only in Spring where as in tropical conditions of South they bloom during Spring, Monsoon and also before onset of winter.

The maturity indices for harvesting of *Ambia* crop of Nagpur mandarin grown at Nagpur have been standardized as minimum 10% Total Soluble Solids content and minimum TSS : acid ratio of 14 for acceptable flavour. (Ladaniya 1996). The optimum stages of harvest for main and monsoon crops of Coorg mandarin have been recommended as Total Soluble Solids : acid ratios 13.2 and 9.1, respectively (Ramana et al. 1980). Darjeeling mandarins (grown at Kalimpong), matured after 214-245 days from fruit set (Roy et al. 1999). Mandarins (Santra) grown under Uttar Pradesh Hill conditions matured after 240 days from anthesis; however, Kinnows matured after 270 days (Vinay Shankar and Sinha 1987). For harvesting of Kinnow under humid, sub mountaneous condition of Hoshiarpur in Punjab, first week of February and under Semi-arid irrigated condition of Abohar, January-February were considered optimum when TSS : acid ratio, TSS content and acidity were 13.70, 11% and 0.8% respectively (Jawanda et al. 1973). Joolka and Awasthi (1980) suggested 4th February as normal harvest time for Kinnow in Himachal Pradesh. Under Hissar condition (Haryana) third week of December has been recommended for harvesting of Kinnow (Surinder Kumar and Chauhan 1989 a).

For Mosambi, Pineapple, Jaffa, Blood Red and Valencia sweet oranges, total soluble solids content of 13.1, 11.8, 12.5, 12.1 and 12.6 and TSS : acid ratio of 30:1, 14:1, 14:1, 14:1 and 10:1, respectively were considered as optimum maturity indices at Abohar (Jawanda 1961). Bakhshi et al. (1967) reported that fruit size, weight, TSS and acidity content decline if Valencia Late fruits are harvested by March 1 and become unpalatable by March end. Sathgudi orange of Andhra Pradesh matured after 240 days from fruit set when juice content was more than 42%, TSS content 9-10% and TSS : acid ratio16-24 (Reddy et al. 1984).

In North Karnataka, acid lime (Kagzi) took 195 days from fruit set to mature with 51.1% juice and 9.3% acidity. The 6.7% acidity content in Tahiti lime *(Citrus latifolia Tanaka)* was found optimum with 255 days for maturity(Rao et al. 1983). Under agroclimatic conditions of Nagpur (Central India) the summer crop (flowering in mid January) of acid lime (Kagzi) took 160 days from anthesis (Ladaniya 1999a). The acidity and juice content were 8.06% and 47.93%. In Andhra Pradesh quality standards for limes have been suggested as 45-58% juice and 6.7-7.7% acidity (Satyanarayana and Ramasubba Reddy 1994).
For Red Blush grapefruit grown in Punjab, TSS content of 17.70% and acidity 1.5% were found optimum (Chohan et al. 1984).

Harvesting : In South India citrus fruits are harvested at one time leading to mixing of good and poor quality fruits. In acid limes and mandarins, pulling off the fruit with the help of bamboo pole with a scythe attached to one end has also been reported (Naik 1948). For Sathgudi oranges careful clipping with shears leaving 2 mm of stem has been recommended (Satyanarayana and Ramasubba Reddy, 1994). Kinnows are harvested by conventional stick beating, garden secateurs and tailor scissors (Jai Singh 1999).

Conventionally Nagpur mandarins are harvested by snap method using ladders and bags causing button hole injury to 8-9% fruit in *Ambia* and 0.5% fruit in *Mrig* crop. Clippers developed by modifying secateurs reduced such injuries. Harvesting was faster in snap method than in clipping but snapping increased storage rots inspite of fungicide treatment. Sweet oranges and acid limes are hand-picked by snap method and collected in bags.

Handling, treatments, packaging

and transport

Degreening : Mandarins and sweet oranges grown in Central and South India do not develop attractive peel colour although desired taste and aroma are attained. In North India with subtropical climate lack of colour is not a problem. The deep orange colour of Nagpur mandarin pulp was attributed to cryptoxanthin while peel contains violaxanthin, crytoxanthin and neoxanthin carotenoids (Subramanyam and Cama, 1965).

Ethrel (1000 ppm) dip or smoke treatment for 24 hrs followed by storage at 24-28°C and 88-90% relative humidity improved colour in Coorg mandarin (Ramana et al. 1973). Addition of benomyl or thiabendazole (0.1%) in ethephon reduced storage rots (Ramana et al. 1979). Green Valencia and Mosambi sweet oranges developed yellow colour within 5-7 days at room temperature after ethrel (1000 - 2000 ppm) dip and lost 6-7% weight during degreening (Arora et al. 1973). In Kagzi lime, ethrel (500-2000 ppm) treatment resulted in yellow colour within 3-5 days at room temperature without adverse effect on quality (Gautam et al. 1977).

Nagpur mandarin fruits having 1/4th, 1/2 and 3/4th green surface could be degreened in 2½, 3½ and 4½ days, respectively at 26-29°C and 90-95% RH with 75-80 ppm ethylene (Ladaniya 1993). In continuous flow method with 5-10 ppm ethylene gas, Nagpur mandarin fruits with 1/2 to 3/4th green surface could be completely degreened within 48 hrs at 26-28°C and 90-95% RH. Pre - and post-harvest carbendazim treatments prior to degreening effectively checked stem-end rots. The Mosambi sweet orange could be degreened in 48 hrs with continuous flow method of ethylene application (Ladaniya1999 c).

With pre-harvest applications of ethrel (2000-4000 ppm) as dip treatment to Washington Navel fruits, degreening could be achieved within 6 days (Chauhan and Rana 1974). Ethephon (250 ppm) pre-harvest spray was found to be effective to degreen Nagpur mandarin (Sonkar and Ladaniya 1999 b). Addition of Calcium acetate (1%) and carbendazim (500 ppm) minimized leaf and fruit drop, and storage decay.

Ethephon treatment increased total soluble solids, sugar and juice content besides yellow colour while chlorophyll, acidity and ascorbic acid content fell (Ramana et al. 1973); Higher juice and total soluble solids content in fruit were reported when ethrel was applied before harvest (Chauhan and Rana 1974).

Manual v/s Mechanized Handling: In Central India Nagpur mandarin fruits are handled manually several times while sorting on rice straw. Fruit is either packed in wooden boxes or transported loose without pre-harvest treatment. Almost similar is the practice for Kinnow mandarin and Sathgudi and Mosambi sweet oranges during bulk handling.

Attempts to assess handling injuries in Nagpur mandarin indicated that collection of harvested fruit from pickers bag to vented plastic crate in the orchard and then directly to packing house resulted in on an average 0.28 number of major cuts and 0.65 number of minor bruises per fruit as compared with 0.69 number of major cuts and 6.1number of minor bruises in conventional handling (10 -12 times) including sorting (Ladaniya et al. 1994).

Commercially, washing and waxing of Nagpur mandarins has been done manually by progressive growers in Central India. Ladaniya and Dass (1994) reported that manual operations resulted in higher decay. Manual process was slow, required large space and more wax as compared to mechanical one. The mechanized sorting, washing, waxing and size grading was standardized for Nagpur mandarin on 12" wide conveyers (Ladaniya et al.1994). This mechanized process has been adopted for Nagpur mandarin and Kinnow in respective growing areas of Maharashtra and Punjab and various such units are now operational. The mechanized handling has also paved way for systematic attempts of larger scale exports since conventional manual handling was not efficient and hygienic. Vented plastic crate is being increasingly used as bulk handling container for Kinnows and Nagpur mandarin. Mandarins placed in crates are being handled with fork lift trucks to minimize fruit injuries in some of the large fruit handling

facilities in the country. Mechanical operations of sorting, washing, waxing and size grading have also been standardized for Mosambi sweet orange (Ladaniya 1999c).Acid lime fruits are handled manually; however, manual grading is a time consuming and labour intensive operation.

Post-harvest treatments : Temperature, relative humidity and wrapping/lining in box are the critical factors as far as water loss from citrus fruit is concerned. Waxed Kinnows could be stored for 30 days at ambient condition and for 85 days at 2.4-4.4°C (Mann and Randhawa 1978). Nagpur mandarins could be kept in acceptable condition for 21 and 60 days at ambient and refrigerated condition, respectively with fungicidal wax coating and PE lining in box (Ladaniya and Sonkar 1997). Various post-harvest treatments with and without wax coating have been tried to extend storage life of mandarin and sweet orange fruits (Table 1). Fungistatic compounds viz. carbendazim, thiabendazole (TBZ), sodium orthophenyl phenol, borax, Aureofungin, benomyl, Captan and diphenylamine have been tried (Subramanian et al. 1973; Kushal Singh et al. 1988; Dhuria et al.1983). Hypochlorite wash followed by wax (4%) coating (made of sugarcane wax, carnauba wax and shellac) with Sodium ortho phenyl phenate (1%) + iso propyl N -phenyl carbamate (300 ppm) controlled *Penicillium* rot in mandarins (Subramanyam et al. 1970).

Geraniol and Mentha oil were fully effective in checking growth of *P. italicum* (Arora and Pandey 1977). Leaf extract of *Ageratun conzyoides* exhibited broad fungistatic spectrum and completely checked *P. italicum* (Dixit et al. 1995) while exctracts of *Eucalyptus globulus*, *Punica granatum*, *Lawsonia innermis* and *Datura species* were effective against *C. gloeosporioides and Botryodiplodia theobromae* (Babu and Reddy 1986). Tulsi (*Ocimum sp.*) leaf extract was also effective against sweet orange rots (Godara and Pathak 1995).An antimicrobial plant extract fermentation based on essential oils and phenolics has been found to reduce losses in Mosambi sweet orange (CFTRI,1984).

Among plant growth regulators, 2,4-D delayed colour development and retained greenness of buttons (Ladaniya and Sonkar 1996a) in mandarins. The Kinetin and Benzyl adenine (40µM) treatments appreciably reduced chlorophyll degradation (Nagar 1993) and polymethylesterase, polygalacturonase and cellulase enzyme activities in stored Kinnow fruits (Nagar 1994). Application of 2,4-D (500 ppm) controlled decay in limes (Kohli and Bhambota 1966). Limes treated with Gibberellic acid(GA3) + waxol (6%) + Bavistin (0.1%) could be stored up to 3 months at 10°C.

Sathgudi and Mosambi sweet oranges had a shelf life of 2 weeks at 15-30°C and 40-70% RH (Singh 1971). The sta-fresh (451) wax coated Mosambi sweet orange fruits packed in perforated polyethylene could be satisfactorily stored up to 30 days at 25±5°C. Wax coating delayed colour development while non-waxed mature green fruits developed colour slowly during 15-20 days. The respiration rate was reduced by 30% in waxed fruit as compared with control . At 5-6°C and 90-95% RH, Mosambi fruits could be stored maximum up to 90 days with 6 days of post-storage shelf life under ambient condition (Ladaniya 1999c).

Prepacking and film wrapping: Polyethylene films of 100, 150 and 200 gauge reduced waterloss in Sathgudi oranges; the decay increased with decreasing percentage of ventilation (Sadasivam et al. 1973). Mosambi sweet orange fruits individually and tray over-wrapped with heat-shrinkable polyethylene (Low density polyethylene) and 'Cryovac' (Polyolefin) films could be satisfactorily stored up to 40 days under ambient conditions (25± 5°C) (Ladaniya 1999b). Polyolefin heat-shrinkable films extended storage life of individual and tray over-wrapped Nagpur mandarins up to 3 weeks at ambient condition and minimized waterloss during long term cool storage and post storage shelf life (Ladaniya et al. 1997). Stretchable low density polyethylene cling films (15 µm thick) were also promising for unipacking of Nagpur mandarin (Sonkar and Ladaniya

1999 a). Film wrapping also extended the storability of Nagpur mandarin fruits during and after refrigerated storage. Keeping in view higher ambient temperatures and higher humidity inside polyethylene films, chlorine wash and carbendazim treatment prior to wrapping have been found to minimize rotting.

Grading, packaging containers and transport : Nagpur mandarins packed in wooden containers are presently size graded as Grade 1 (Medium) 6.40 to 6.70 cm (140-160 count), Grade 2 (Extra Large) 7.30 to 8.0 cm (80-20 count) and Grade 3 (small), 5.50 to 6.00 cm (168-200 count).Kinnows are marketed without grading but sizing is done(Sandhu 1990). In Darjeeling and other hilly areas like Sikkim, fruits are brought to assembly market as head loads or on animal backs (DMI 1965). Nagpur mandarins are also transported loose in trucks without any post-harvest treatment. Air-conditioned rail coaches after appropriate structural changes can be used for transportation of fresh produce including citrus (CFTRI 1982). Nearly 40 to 50% of Nagpur mandarin fruit produced in Central India is packed in conventional wooden boxes (48x 35 x 35 cm) with rice straw for dispatch to distant markets either from orchard or assembly markets. The cost advantage is usually lost in transporting fruits loose as the losses are high. Kinnows are transported by truck after packing in gunny bags or bamboo baskets with grass (Chauhan et al. 1987). Anandswamy and Venkatsubbiah (1976) improved wooden cases (42x32x29 cm internal dimensions) to hold 110-120 mandarins and also developed ventilated corrugated fibre board boxes (46.5 x 27.5 x 27.5 cm internal dimensions) with 18 kg gross weight for export of Coorg mandarins. Gunny bags and bamboo baskets were cheaper than CFB and wooden boxes for transporting Kinnows but losses were higher in bags and baskets (Jain and Chauhan 1994). Full telescopic, 5 ply, Corrugated Fibre Board (50 x 30 x 30cm) boxes were better than regular slotted containers(single piece containers) for packing of Nagpur mandarin (Ladaniya et al 1999). However, Regular Slotted Containers (single piece boxes) were less expensive and 500 such CFB boxes could be accomodated in a truck as against 400 wooden boxes. Corrugated fibre board boxes made from cotton plant (stalks)kraft paper were economical and equally sturdy as compared with conventional wooden box (Ladaniya and Shyam Singh 1998). The size grades for Sathgudi sweet orange are suggested as I = 6.5 cm and above, II = 5 to 6.5 cm and III = 5 cm and less; however, from Andhra Pradesh, fruits are sent by trucks to distant markets without packing and grading (Satyanarayan and Ramasubbareddy 1994). Similar is the mode of transport for Mosambi orange grown in Maharashtra.

Precooling and storage

Precooling : Forced-air cooling of mandarins at 6-7°C and 90-95% RH with air flow of 0.1 cum/kg was most suitable and rapid in a specially designed precooler of 0.5 tonne capacity (Ladaniya 1995). Ventilation level of 6.00% on side panels of CFB box resulted in 35 to 50% faster cooling than 2.00% vents during forced air cooling (Ladaniya and Shyam Singh 1998).

Cool Storage : The climate during cultivation/growth of fruits affect response of fruit to storage temperature. Nagpur mandarin grown in North could be stored at 2.2 - 3.9°C for 4-5 months without chilling injury (Mukherjee and Singh 1983) while fruits grown near Nagpur suffered chilling at 3.5 - 5.0°C after 90 and 30 days in Spring (*Ambia*) and Monsoon (*Mrig*) blossom crops, respectively (Ladaniya and Sonkar 1996b). At 5.25-6.85°C and 90-95% RH, there was no chilling injury but after 90 days,juice vesicles dried and taste was insipid although fruit was acceptable from outside. Darjeeling mandarins stored well at 4-6°C whereas chilling occured at 1.5 -3°C (Trivedy and Mazumdar 1982). The storage temperatures of 3.88-5.55°C and 5.55-7.2°C were optimum for Coorg mandarin and Sathgudi orange, respectively with corresponding storage life of 12 and 16 weeks (Singh 1971). For Kinnow, Malta and Mosambi orange grown at Saharanpur, 4.4-6.1°C temperature was found better than 2.2-3.9°C (Mukherjee and Singh 1983).

Lemons, could be stored at 6.5-8.0°C temperature with a storage life of 2.5-3 months (Gandhi 1956).

Late harvested Kinnows did not store well (Mann 1978) where as fruits harvested in mid-January had least spoilage and weightloss (Dhillon and Randhawa 1983). Completely orange coloured Kinnows could be stored longer and retained higher TSS and Vitamin C content than green and yellow-green fruits (Chundawat et al. 1978). Activities of polymethylesterase, polygalacturonase and cellulase enzymes increased with delay in harvest of Kinnows and late harvested fruits deteriorated faster in storage (Nagar 1995). In grapefruits, early harvest resulted in less losses than harvesting in late December and cultivar Foster Pink could be stored longer than Ganganagar Red (Gupta et al. 1981a).

Evaporative cool storage : In zero energy cool chamber (1 quintal capacity) storage life of grapefruit, acid lime, Nagpur mandarin, Kinnow and Darjeeling orange extended up to 77, 35, 42, 60 and 42 days as compared with 27, 11, 14, 14 and 14 days, respectively in winter months under Delhi conditions (Anonymous 1991). Storage life of Nagpur mandarin could be extend up to 3 weeks in 1.5 tonne storage capacity cool chamber (Ladaniya 1997b). In 8 tonne capacity cool chamber, Kinnow mandarins could be kept up to 40 days as against 15 days at room temperature with 15% weightloss (Pal et al. 1997). The disinfectant and fungicide treatments to fruits were found necessary for storage in these chambers considering high humidity inside.

Controlled or Modified atmosphere (CA/MA) storage : The modified atmosphere with elevated CO_2 levels (2,3,4 and 5%) at 5±1°C and 8-30°C have been tried for storage of Kinnows (Amarjit Singh and Rajinder Singh 1996). With all CO_2 concentrations the TSS/acid ratio ranged from 14-21 at 5±1°C and fruits' storage life increased up to 140 days at low temperature as compared with 100 days at room temperature. Irrespective of CO_2 levels, rotting appeared after 30 days at room temperature (Amarjit Singh et al. 1992).

Physiological and physico-chemical changes during storage

Waterloss, softening and development of insipid taste and off flavour are the major deteriorative changes after harvest of citrus fruits. The low respiration rate of Nagpur mandarins (40 µg CO_2/kg/hr) was further reduced by 34.78% due to waxing under ambient storage conditions. At low temperature (6-7°C), respiration rate of 15 mg CO_2/kg/hr was further lowered by 10.34% due to waxing . With rapid waterloss, TSS and acidity levels increased and ascorbic acid content declined in Kinnow fruits (Chundawat et al. 1978). Trend was similar in acid lime (Kohli and Bhambota, 1966) and sweet orange (Barua et al. 1992) stored at room temperature. If humidity was kept higher (with PE liner) acidity declined in Coorg mandarin (Angadi and Shantha Krishnamurthy 1992). Sinha et al. (1990) reported that peel oil volatiles viz. limonene, linalool, myrcene, citronellal and citral of various mandarin fruits were lost rapidly at room temperature than at low temperature. Enzymes viz. polyphenoloxidase and peroxidase (Chauhan et al. 1980) and polymethylesterase, polygalacturonase and cellulase (Nagar1994) increased during ambient storage indicating senescence of citrus fruits. Under refrigerated storage conditions, juice content, ascorbic acid, TSS and acidity content declined in Nagpur mandarin (Ladaniya and Sonkar 1996 b). In modified atmosphere with elevated CO_2 levels, increase or decrease of acidity and sugars were very slow while ascorbic acid declined at 5±1°C and 8-30°C (Amarjit Singh and Rajinder Singh 1997).

Post-harvest diseases and disorders

*Alterneria tenuis Auct (*causing black core rot*), Alternaria citri, Alternaria alternata; Penicillium digitatum, P. italicum, Geotrichum candidum, Diplodia natalensis and Colletotrichum gloesporioides* were found to incite decay in mandarins (Ramana et al. 1983; Ullasa and Rawal 1988).The physiological disorders reduce market value of citrus fruits and development of disorders depend on management

of temperature, humidity and handling. The curing (holding of fruit for 1-2 days after harvest), brushing and packing without polyethylene liner had cumulative effect on development of brown coloured, sunken breakdown of collar in Nagpur mandarin (Ladaniya and Sonkar 1997a). Kinnow fruits do not get puffy while *Citrus reticulata* (mandarin) Santra fruits become puffy during storage . Most disorders appearing on surface of citrus fruits are related to rupture of oil glands and subsequent waterloss. The subotpimal low storage temperature caused chilling injury in the form of irregular brown coloured pitted lesions and dull yellow coloured watery breakdown in mandarins

Domestic marketing and export

Domestic market : Citrus fruits are marketed through following channels in the country. 1) Orchardists auction the crop at fruit set or at harvest. 2) The contractor or orchardist sells the crop to wholesale buyer in local markets through commission agent who sells it further to retailer or send the produce to distant market. 3) Growers, crop contractors and wholesalers also sell produce to processing units. This marketing set up resulted in unpredictable fluctuations in the prices and huge losses to growers in bumper crop seasons. Storage of mandarins at Delhi resulted in better returns to growers (Randhawa and Kahlon 1957). However, lack of storage and processing facilities, poor transport and absence of co-operative marketing structure have affected citrus industry. Producers' share in price paid by consumers was found to be 40-70% (DMI 1965). National Dairy Development Board have started direct purchase of fruit from citrus producers and marketing in cities like Calcutta and New Delhi. Producers' cooperatives viz. FRESH in Hyderabad and Horticultural Produce Cooperative Marketing Societies (in Bangalore, Karnataka) started retail marketing thus growers' share in the price paid by consumers have increased up to 85% and consumers also have to pay less. Subramanyam (1986) observed that every rupee spent on chemical treatment to mandarins to minimize losses, fetched Rs. 2.63 to 10.33 in return depending on chemicals used. This has got double benefit of not only increasing returns to traders but also benefits to consumers as minimizing the transit loss helps to reduce transport cost and thus commodity price.

Exports : Mandarins, sweet oranges, limes and lemons are exported since long and 3912 tonnes of citrus fruits worth 14.67 lakh rupees were exported in early sixties (DMI 1965). Recently Kinnows were exported from Punjab (200 tonnes) and Rajasthan (374 tonnes) to Srilanka, United Kingdom and Gulf Countries in refrigerated containers (NHB 1996). India exported 18367 tonnes of citrus fruits worth Rs. 1430 lakh during 1995-1996 (APEDA 1997). Mandarins constitute the bulk of citrus exports from India. Most of exports are by road ways to neighbouring Bangladesh and Nepal without cooling. During trial shipments, 4 and 9 tonnes of graded, waxed and CFB carton-packed Coorg mandarins (from Coorg, Karnataka) were exported to Singapore in good condition in refrigerated cargoship-hold maintained at 4.4 - 5.6°C and 85-90% RH (Anandswamy and Venkatsubbaiah 1976). In recent past, with establishment of precooling and packing houses in Maharashtra and Punjab,several hundred tonnes of Nagpur mandarin and Kinnow have been exported in refrigerated reefer containers. Besides inadequate infrastructure, poor quality of fruits, low productivity and high cost of production are some major constraints in export of citrus fruits from the country. Package of practices for production of exportable quality Nagpur mandarins need to be standardized as the efforts were made to develop handling technologies. Yield of exportable quality fruit increased with proper orchard management practices (Ladaniya and Shyam Singh 1999).

During export to some countries, pesticide residue analysis is mandatory. Among fungicides, benomyl, carbendazim and thiabendazole are permitted for use on citrus. The thiabendazole residues were within tolerance limit when applied @ 1000 ppm

with wax (6%) as post-harvest treatment (Ramana et al. 1983). Insecticides are used prior to harvest but application has to be scheduled for residues to be within specified limits. In Mosambi sweet orange, waiting periods of 32 and 34 days were required for monocrotophos and quinalphos residues to be within 0.2 and 0.25 ppm tolerance limits, respectively (Awasthi and Anand 1986). In acid limes waiting times were 14-15, 13-19 and 7-10 days for monocrotophos, quinalphos and phosphamidon, respectively (Awasthi and Ahuja 1989) where as synthetic pyrethroides dissipated much faster (waiting period 1-4 days) except permethrin (8-13 days).

FUTURE RESEARCH

Research needs to be focussed to extend storage life of mandarins beyond 6-8 weeks with minimum off flavour and drying of juice vesicles, Genetic manipulation of citrus cultivars for longer shelf life and disease resistance through conventional and modern/ biotechnological improvement methods can be one of the long term objectives of future research. Biochemical changes during ambient, refrigerated and gas storage and various volatiles emanating with their effect on physiology and quality of citrus fruits remain to be investigated in detail. Pre-packing of half or one dozen citrus fruits with various films for retail marketing have tremendous scope under Indian condition. The scientific grade standards of important cultivars need to be developed for orderly marketing through co-operatives and super markets. Lot of work remains to be done to standardize conditions of transport carriers. Eco-friendly non-hazardous chemicals, botanicals/ treatments, and methods of using bioagents to protect and preserve harvested produce would go a long way in post -harvest management of citrus fruits in the country in future.

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Table 1 Effect of various growth regulators, fungistats, chemicals and lining/wrapping on storage life of mandarin and sweet orange fruits

Cultivar	Best treatment	Storage temperature	Storage(Days)	Reference
Mandarin				
Coorg	4% wax + 1% SOPP two coatings	25-30°C	24	Dalal et al. (1962b)
Coorg (Main)	4% wax	7° C; 85-90% RH	75	Dalal et al. (1974)
Coorg	3% wax + 2,4-D (100 ppm) + PE	20-26°C	21	Gopalkrishna rao and Krishnamurthy
Coorg	0.1% TBZ	5-7°C	60	Subramanian et al. (1973)
Kinnow	Wax 6% + Benlate 0.1% + PE	0-4°C	60	Dhillon et al. (1976)
Khasi	Wax 3% + Benlate (350 ppm) + PE	11 -19°C	24	Karibasappa and Gupta (1988)
Kinnow	Diphenyl paper (40 mg/paper) wrapper	20±4°C	28	Mishra (1989)
Nagpur	Wax 2.5 % (Highshine) + carbendazim (2000 ppm) + vented PE	20-35°C; 50-60% RH	21	Ladaniya and Sonkar (1997a)
Sweet orange				
Sathgudi	6% wax + SOPP (0.5%)	26-28°C	30-34	Dalal et al. (1962a)
Blood Red, Valencia	2,4-D (100 ppm) + Polyethylene bag	19-32°C	30-60	Kohli and Bhambota (1965)
Sathgudi	12% wax +vented polyethylene bag	5.6°C	75	Sadashivam et al. (1972)
Blood Red	Wax (12%) + 2,4,-D (50 ppm)	Room temp	45	Bhullar (1982)
Mosambi	Sta-fresh 451 (1:1 dilution)+PE	25± 5°C 5-6°C; 90-95% RH	30 90	Ladaniya (1999c)

Note: PE, Polyethylene liner / bag

GENERAL ARTICLES

GLOBAL TRENDS AND POLICIES IN FOOD PACKAGING*

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INTRODUCTION

The packaging industry comprises three major activities -the production of materials required, their conversion into packaging containers and the filling of packages by end user industries. The last decade has seen packaging technology making great advancement in the development and application of new products and processes which have been responsible for continuing the retailing revolution in the western world and Japan. This is particularly because plastics flexible packaging where new films, coatings and packaging systems have been introduced which have been instrumental in transfroming food and grocery distribution and retailing into new plane. On the other hand, canned foods with the advantages of long shelf life, durability and ease of distribution have been facing the challenges of food manufacturers to improve their freshness, sensory appeals and convenience. The common challenge for all segments of packaging has been the global emphasis on package waste management. The options for this include, reduce, reuse, recycle and dispose. New trends in packaging are emerging in an effort to meet solid waste disposal concerns and consumer preferences.

The value of world packaging industry taking into account all the major packaging materials - paper board, plastic, metal, glass etc. is currently valued at around US$400 Billion. The US is the largest single packaging market at 27% followed by western Europe at about 28%; Japan 16%; Asia Pacific 14%. However, it is Asia which offers the greatest potential for growth opportunities in the world packaging market. As far as India is concerned, food industry contributes about 18% of India's manufacturing output and around 5% of total industrial investment. The food and beverage industry is highly heterogeneous and the turnover is estimated at Rs 600 Billion. The packaged and branded food products, in recent times, have witnessed rapid growth and competition. This rate of growth is expected to be sustained for many years to come as the base is low. Metal packaging and plastics packaging are two major segments of the food packaging industry and globally both have been competing with each to grow their share of the markets.

Metal Containers

Open Top Sanitary cans made of Tinplate and Tin Free Steel (TFS) continue to be the major work horse for packaging of processed human and pet foods. They have distinct advantages namely, reliability, safety, pilfer proofness, recyclability, strength to withstand transportation, lower energy consumption, retortability under high temperature conditions, high speed filling, closing etc..

There are three major types of metal containers used in the world of food and beverage packaging. These are :

(a) 3pc can : This consists of body and two ends and the body is usually welded and the top end could be an EO end made of aluminium or steel. The bottom end

is made of steel.

(b) 2pc can : Drawn and Wall Ironed (DWI) and could be made of steel or aluminium. A circular blank is drawn through a die to form a shallow cup and then redrawn through a second or third die to produce a can of desired dimensions. Formed body is coated internally with a protective spray lacquer and externally lithographed. Used mainly for packing beer, soft drinks etc. The ends are usually of E.O.type.

(c) 2 pc can Draw-Redraw (DRD) uses : This is a process for making two piece can from steel or aluminium in which a circular blank is drawn through a die to from a shallow cup and then redrawn through a second die to produce a can of desired dimensions. Plate is coated with lacquer for product protection prior to the forming process. Also, plastic laminated metal has been introduced commercially.

Developments in Can-Making industry

The metal packaging industry in the last five decades has grown from a few million to an annual global production of 400 billion cans. During this period, both steel and aluminium have grown equally well. At the same time, significant advances in material science, tooling, lithography and other aspects of can making have taken place. The manufacturing line speeds as well as food filling line speeds have increased very significantly. Many innovative developments have been taking place in the can making materials and processes which enable the industry to retain its leadership in metal packaging.

The tinplate costs constitute nearly 60% of the total costs of the can and any reduction here directly reduces the unit cost. This has been an ongoing process over the last few decades with the advent of new steel and aluminium manufacturing technologies.

Use of DR Plate

The major thrust over the last few years has been the gradual reduction of the costs of two ends which, depending on diameter and height of cans constitute 30-45% (of the 60%) by gradually raising the surface utilisation factor from 70-87% by successive innovations (straight lay out with multiple die, secondary scrolling and staggering, reducing intermediate and side shred margins form 2 mm to 0.75mm). In addition, the end diameters have been significantly reduced by the process of "necking in" of bodies.

In recent times, the most significant savings have come from the use of thin ultra thin Double Reduced Steel. Depending on the size, the reduction has ranged from 6-28% as compared with conventional metal process. Further down gauging is going on.

Coatings and Sealants

Significant advances have taken place in the field of organic coatings used for protection and wide choice of resins including epoxy, acrylic, polyester, vinyl etc are now available. Water based coatings are commercially used to reduce atmospheric pollution and this trend will continue. Likewise, both water-based and solvent-bsed sealants are used on ends for high speed manufacture to provide hermetic sealing. The trend will be to switch over to water-based sealants.

Design of Can Ends

Industry has developed software modelling systems to examine design options for E.O. ends. Such systems evaluate the usability of ends by running simulated tests like axial load and vacuum tests and will predict opening rupture and tearing forces. These developments will enable designing and prototyping of food and beverage ends with optimisation of machinery.

Peelable Easy open Ends for Metal Cans

Peelable easy open ends for food cans are rapidly finding their way into markets all over the world. There are various versions available which enable easy opening, reducing costs, faster production and acceptable integrity levels. Dry foods such as milk, chocolate, instant coffee are targeted.

Easy Open Ends for Processed Foods

Beverage cans almost exclusively use pull tab E.O ends. However, the use of steel full aperture E.O ends for processed foods is rather less prevalent due to various

reasons, including the feelings of marketing functionaries that the consumer may not accept the additional cost, the performance of E.O ends on processed foods was not reliable enough and the potential however slight to injure customers. Notwithstanding these factors, major global processed food people have now introduced commercially for soups and other processed foods the "Safety ends" with folds that protect the edges. This development is expected to extend the use of steel E.O ends in the next 5 years.

Lithography

Digital imaging and new reprography ics such as, Vista system to print high quality photographic images are being introduced commercially. The system works by producing plates with exceptionally sharp dots at high resolution. Photographic quality can be obtained at high speeds on steel or aluminium cans. Developments such as u/v curing inks, jet printing, shrink wrapping of printed labels have enabled high quality, high speed printing/labelling of cans.

Tapered Cans

Slight taper of the can body enables to have can line in one location and shipping cans to distant sites with minimum freight costs and shipping space. This enables centralised operations.

The long term growth of canned food market is said to rest with its ability to attract younger consumers. This would mean that the can maker and the food packer will have to work together through expansion into value-added products.

Despite metal packaging having several success stories there has been a perennial threat from other materials, particularly plastics in the food and beverage sector. The significant development which is getting into focus is the marrying of the metal with the polymeric materials to reduce costs and to meet increasing regulatiory pressures. This development will gather momentum over the next two years for packaging of food and beverages.

One of the significant success stories that has happened commercially in Japan is the "Bottle can". The material used is polyster-laminated aluminium sheet for the can components. The body is bottle shaped. The closure is an ROPP cap with a moulded liner.

The advantages claimed with this can are :

- resealability - distinct advantage over conventional metal cans for beer and beverages.

- Lightness-a 500ml can size bottle can weigh about 24g which is 65% of PET bottle of same capacity (37g).

- Excellent recyclability because of mono - metal structure

- Longer shelf life of product because of greater gas barrier properties than PET bottle.

The manufacturing system for the laminates are environmentally friendly as they require no water, solvents or chemicals and emit no gases or vapors. In future, these materials and systems could greatly reduce the cost of cans.

Quality Control

Can manufacturing speeds have been stepped up considerably-going upto 3000 cans per minute. It is important to ensure that at these speeds, consistency in quality in all aspects of manufacture is maintained and towards this, various sophisticated tools have been developed and used commercially. These include on -line film weight monitoring, lacquer viscosity control, film weight gauge, enamel rating etc for 3 pc cans and coating viscosity control, spray line control, mis-spray detection, oven data logging, dome testers etc for 2pc can manufacture.

The above developments are illustrative of innovations taking place in the can making industry which will help to maintain the leadership position in the packaging field in the years ahead.

Plastics in Packaging

Flexible packaging has advanced rapidly in the last 30 years and is poised to claim a greater share of the market for packaging of foods. Equally the market for the plastic bottles, jars, caps etc have grown significantly. This has been possible because resin and film and bottle producers, converters, packaging and food processing machinery

manufacturers have been working closely on a 'system packaging' basis.

Highlights of some of developments of relevance for the future are:

* Enhancement of barrier packaging performance for extended shelf life eg metallocene polymers; Sclartech solution PE technology, Polyethylene Napthalate (PEN)
* Bio-degradable polymers : produce from agricultural feed stocks and food processing wastes.
* Microwaveable films : for foods such as ready meals, soups and sauces. Not commercially successful yet in large scale.
* Variable permeability films : Claims are made to offer temperature-sensitive variable oxygen permeability which would have important applications for packing high respiration fresh produce. The film is a co-extruded material which relies for properties on differential expansion of the two film layers.
* Developments under progress to assess potential of a very cheap and simple E-coli bacteria detector test which could be incorporated into food packing to warn consumers if they face risk of *E.coli* food poisoning. The indication would be incorporated in the wrapping film which is expected to change colour of the food if contaminated.
* High gas permeability films: Micro perforated films allow the fresh produce to breathe and at the same time extend shelf life. These films can be tailored for oxygen permeation rates to meet individual requirement of different types of fresh produce. Microperforated films have higher OTR than microporous films. These films are commercially used extensively.

Natural Plastics

Research is underway to develop genetically engineered oilseeds to produce biodegradable plastic polymers in its leaves and seeds. Once extracted, the naturally derived plastics can be used in the same way as oil-based polymers.

Oxygen Scavenging

Beer in bottles deteriorates on storage in terms of flavour, clarity and colour due to oxygen though the flover liner.

An oxygen scavenger can be incorporated in the sealant of a bottle cap.

* The sealant with the scavenger is moisture activated and stable under normal use condition prior to closing.
* It has the ability to scavenge approximately 1 mg of oxygen (for crowns)
* Full FDA compliance.
* Scavenger migration below detection limits in beer.

This is commercially used for beer and it enables removal of added preservative from bulk beer without loss of flavour stability . It enhances the shelf life of beer, minimize haze formation and colour change. Use of oxygen scavenging agent with multi layer PET bottles (DAREVAL) having EVOR has enabled commercial beer packing in pet bottle with shelf life similar to glass bottle. Use of oxygen scavenging agent in sealant has the potential to enhance the shelf life of ketchups, sauces, fruit juices.

Processing Technology

In the field of processing technology, the multi-layer co-extrusion process has become very popular. This process enables combining by simultaneous extrusion, a variety of polymers such as nylon, polyolefins, and ionomers, PVC. EVA. EVOH etc. Such barrier laminates are used for packaging products which are sensitive to oxygen, light, moisture, requiring hot filling, thermal retorting or aseptic filling. Commercially, they are used for packing preserves, pastes, puree, fruit juice concentrates, particulate products, ready to eat curries etc. Form - fill - seal machines which can exclude headspace oxygen while packing products cold or hot (upto 95° C) are available. Suitable laminates have been developed for packing in the weight range 0.5kg to 10kg with speeds upto 25 pieces per minute. Pouch cost compared to

metal can of equal capacity is much lower, but the capital cost of the filling and sealing equipment is rather high.

Environmental Issues and Package Waste Management

Enlightened organisations are conscious of current environmental issues specifically relating to packaging materials. They operate to certain goals in order to reduce pollution and minimize waste arising out of packaging. These include:

* Operate the business in compliance with all applicable laws and regulations;
* Work towards reducing the impact of product packaging by taking steps to eliminate heavy metals, inks, colo-urants, additidves which leave hazardous residues when disposed of;
* Reduce the volume and weight of packaging;
* Use recycled and recyclable materials in packaging;
* Support efforts to educate consumers on how they become part of recycling solution.

Global policies on environment and food safety will become increasingly significant; greater accuracy of detection of food contaminants will be demanded and the industry will be expected to meet the challenges and cost may not be an issue.

Biodegradable plastics are materials on which a lot of research is going on. They are somewhat expensive but gradually some materials are being introduced commercially. For instance, a biodegradable yoghurt container was introduced in the U.K. which was made from polylactic acid (PLA) obtained from vegetables, such as maize or beet root.

Generally, polymeric materials derived from agricultural feed stocks as well as marine food processing wastes form the base in developing eco-friendly package development.

Conclusion

The future trends in food packaging will continue to focus on cost reduction and improving barrier properties. The challenge for the packaging industry will be for all the relevant people to work together to implement the increasing global regulatory policies on food contact safety, minimising atmospheric pollution during package manufacture and deal effectively on package waste management. Needless to say, these objectives can be met only when all the three segments of the packaging industry, namely, the material manufacturer, converter and user industry work together in an integrated manner.

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FOOD FOR THOUGHT-IS IT DIGESTIBLE?*

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Global processed food industry has just touched the Rs 1.6 million crore bench mark and is growing at a decent pace well ahead of other manufacturing sectors. In contrast, India, boasting of population almost one fifth that of the world, is reported to have a "marketed" food business worth Rs 1.4 lakh crore, if the value of output by primary processing sector with very low value addition is also taken into consideration. The size of Indian food industry is estimated at 5-6 lakh units and involved really in some form of processing of one material or the other. In commodity processing, top 3 companies in the world account for Rs 3.23 lakh crore while our best company NDDB can boast of a paltry Rs 2,000 crore turn over annually. Top 6 companies in the world involved in value addition in foods through branded products have an annual businesss volume of Rs 6.47 lakh crore, while our best 5 companies accounted for only Rs 4,750 crore. In retailing business, 6 major global companies report Rs 3.34 lakh crore business, while in India, we do not have a major player leaving the retailing to millions of scattered vending outlets mostly single ownership entities. Average size of a company in the first 20 major food processing industries in USA/Europe is in the range of Rs 14,000-40,000 crore. In India, the corresponding figure is hardly Rs 500 crore.

Following points need to be recognised giving us much food for thought.

- Value of India's farm production of agro-livestock is equal to that of USA though slightly less than that of China.
- India's manpower is rated one of the best, if not the best, in the world.
- India's varied weather conditions are considered congenial for high productivity at the farm level; yet our productivity in most sectors is ridiculously low inspite of Green and White Revolutions.
- The R & D institutions in post-harvest technology are internationally recognised, but their tangible output is only of academic interest, and not of any relevance to the needs of the vast majority of process industries in India.
- Countries like China, Korea, Thailand, Malaysia, which were much behind India during fifties and sixties are way ahead of us now in food industry development.

CII-McKinsey Report raises vision of a 3-fold expansion of food processing industry by 2005. A critical look at the ground realities as it exists today gives a different picture. The much-gloated "Sun-rise" industry may well witness a "Sun-set" scenario because of several factors.

- Past experience is of total neglect of this vital sector all around and its continuation even today inspite of liberalisation trend of the past decade. Downgrading of the erstwhile Ministry of Food Processing Industry to a small Department by Government of India is a classical example. Is this forward looking?
- Low per capita GDP and savings and their low growth rates are not conducive to high value addition to food raw materials. How long will it take for us to overcome this situation?
- Centuries of tradition and culture have evolved firmly established consumption habits amongst the population and organised food industry is totally oblivious of these realities. They

* Reprinted from *Indian Food Industry*, March - April 2001

are deploying their resources on Western-oriented food products development and promotion, ignoring the vast array of ethnic foods, which are crying for developmental attention from industry and scientific community. Will we ever learn and accept this fact?

- Continued low agricultural productivity by Indian farmers inspite of green and white revolutions invariably inflates the factory gate price of raw materials for the industry to unbearably high levels, as high as 55% of production cost. Does our political system ever recognise this major hurdle for industrial growth?

- The woeful infrastructure, recognised as a major bottleneck for any meaningful growth of any industry, continues to be neglected, with no visible improvements in sight. When can our industry sector hope to get a decent infrastructure support to compete globally?

- 13-52% value addition recorded by some of the food processing industries is mostly due to financial levies by the governments at Center, State and local levels and contributions by technology and skill are very little. Is it realistic to expect our governments to treat food industry on par with IT industry and provide some incentives? Will the governments wake up even at this late hour to declare a moratorium on all taxes and duties in food sector for at least 10 years?

- The existing scattered marketing system is a nightmare for any entrepreneur striving to establish as a viable entity. Will we ever be able to create conducive conditions for large marketing organizations to set up shops with countryside outlets for the benefits of the manufacturing industry?

- Will the micro and small enterprises, which make up a significant part of the food industry landscape in the country, ever be able to upgrade and expand their operations if technology developing agencies funded by government have nothing but utter contempt for them? Can we ever hope for an open arm acceptance of these vital players by the R & D agencies?

- The brutal and unrealistic regime of quality surveillance imposed on the food industry vide PFA Act can never be expected to facilitate its growth, encourage innovation and attract any significant investment of sizeable dimension. Will we ever be able to really harmonise our food standards and legislation with international benchmarks, instead of only talking about it? Will the punitive and restrictive food legislations give way to practical and logical ones?

- Will the present multi-agencies contryregimen give way to a single facilitation regimen, cutting across ministerial and bureaucratic barriers to coordinate food industry development?

- Will we ever be able to put in place a policy that will compel the industry to go for backward integration in a big way that will benefit the agriculture sector in the long run?

If we are not able to address these issues without further loss of time, any vision of a resurgent Indian food industry is likely to remain a pipe dream. Any number of seminars, workshops, meetings, committees, press conferences and press notes, foreign visits, sermons, aimless missions, irrelevant technology imports, global shows, etc, will have little impact on the industry and its future.

FOOD PROCESING INDUSTRY IN INDIA*

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Although we are one of the largest producers of raw materials for the food processing industry in the world, the industry itself is extremely underdeveloped in India. Less than 2% of fruit and vegetable production is processed, compared with 30% in Thailand, 70% in Brazil, 78% in Philippines and 80% in Malaysia. The value addition in the food sector is still very low at 7%.

In the last decade, India has moved from an era of scarcity to one of plenty. In the production of fruits and vegetables which was just 50% of the total quantity of food grains production had now become 66% of the total quantity of production of food grains. By the year 2010., it is estimated that the production of fruits and vegetables would be 80% of the quantity of food grains produced in India. Coupled with the fact that the yield of these crops in India is just about one-third, compared to other countries, we can imagine the sort of spurt that is probable in the sector.

In the situation that prevails in India, 90% of the fruits and vegetables produced are marketed by the farmers as compared to less than 20% of cereals. This shows that the main challenge the food sector is going to face in the coming decades will be one of marketing, which hitherto has been a major constraint in its growth and it is here that the thrust of our policy will have to be.

In this scenario, food processing becomes critical. This would mop up surpluses at farm level and ensure fair price for the producer. It would also ensure availability of the produce at reasonable price for the consumer. In addition, the employment generation potential of this sector is much higher than other sectors i.e. 54,000 persons get direct employment per 1,000 crore of investment in the food sector in comparison to 48,000 in textiles and 25,000 in paper industry. There is also a 4-fold generation of indirect employment in ancillary and other downstream activities on account of the investment in food sector. Furthermore, 60% of the employment generation is in small towns and rural areas.

The primary reason why the food processing sector has not developed is that agriculture has largely been for subsistence and not market driven. This has not yielded adequate surpluses for processing and coupled with it, the low yield of crops has choked it. The lack of awareness about the processable variety of raw material and the non-availability of suitable raw material in terms of size, colour, texture, etc., has contributed to the absence of volumes of processable varieties and therefore, economies of scale. The present tax structure also drives a wedge between branded products manufactured in the organized sector and products from the unorganized sector. In fact, the tax in India on processed food is amongst the highest in the world and has been a major single impediment in attracting investments, both locally and from abroad. This is coupled with the fad that investments in the processing industries are in any case at high risk and yield low returns. Investments are further depressed because despite the apparent advantage of hygiene and quality, the price sensitive Indian consumer has stayed away from the high priced packaged foodstuff.

Another reason for poor processing is the high risk and low margin of this sector on account of seasonality, non-availability of raw material, high inventory carrying cost due to purchases at the time of abundance and the very high cost of packaging, i.e., around 40% of

* Reprinted from *Indian Food Industry*, March - April 2001

the estimated product price. Lastly, the issue of poor infrastructure, such as lack of integrated cold chain, roads, power, etc., has also hampered processing.

There is need to aim at increasing food processing from a low of 2% as at present to 10% by 2010. This would entail an investment of Rs. 1,40,000 crore in the food processing sector. The investment would generate direct employment for about 77 lakh persons and indirect employment for about 3 crores. This would also reduce wastages by about Rs.8,000 crore. Apart from these advantages, the value addition of food products will go up from 7% to 35% which will be reflected in corresponding increases in GNP. The thrust will, therefore, have to be to attract foreign and domestic investments and generate internal accruals of the above said magnitude. It is relevant to note that in the first few years after 1991-92, when the industry was de-licensed and major impediments on FDI were removed, a total investment of Rs. 7,200 crore was committed. This trend was reversed only when excise duty was first introduced in 1997-98.

The existence of multifarious laws and multiple authorities is a major hurdle. Many of these laws were framed some 50 years ago like Prevention of Food Adulteration Act and were meant to serve the purpose of food safety and to prevent adulteration. Similarly, many of the statutory orders like Fruit Products Order, Meat and Meat Products Order and Milk and Milk Products Order were brought into being under the Essential Commodities Act when there was acute scarcity of food items. In the context of liberalization, these laws throttle development and invariably work as dampeners for the growth of the industry. There is, therefore, an acute need for harmonizing the existing food laws and to bring about a development orientation to facilitate faster growth of the industry.

This approach would bring about corporate entities operating large integrated food procurement cum distribution companies, which operate from the farm to the department store. In this changed scenario, the small scale industries, which constitute the majority of the food processing industries need to be adequately protected. In order to provide adequate protection and help them, the industrial corporates as delineated above will have to become anchors to assist and nurture them. Besides these anchor industrial corporates, a number of food parks could be established so as to provide adequate help in adhering to international standards by means of establishment of common facilities. The chosen/ anchor industries will help them to market the primary and secondary levels of processed items and to convert them into value added products for sale through their different network of distribution channels including export.

In the short term by means of bringing about a tax holiday for the food processing sector for a period of 10 years, a proper enabling environment can be created for bringing in adequate investments both from within the country and through foreign direct investment.

In the short term, by means of bringing about a tax holiday for the food processing sector for a period of 10 years, a proper enabling environment can be created for bringing in adequate investments both from within the country and through foreign direct investment. Such a tax holiday, need not cover tobacco, aerated drinks, Indian made foreign liquor and plantation items. The enactment of Processed Food Development Act and measures for generic promotion can also be done along with industry in locating markets by means of market intelligence. The attempt during the short term period of say the next 3 years should be to develop a strong data base and a market intelligence network. Besides these, certain special provisions will also have to be made for development of North-Eastern region, hilly areas, islands, ITDP, desert areas and other difficult areas.

In the medium term of 5 to 10 years, the policy framework should attempt at establish a network of R & D institutions. Identification of anchor industrial corporates and development of food parks in all the States with reference to their regional

strengths could be achieved during this period.

Worldwide, the food processing industries are considered sunrise industries and have the potential of attracting huge local and foreign investments. These investments will not only accelerate the pace of industrialization, but will also lead to improvements in both rural and urban infrastructure.

Appropriate policies and schemes could be envisaged for establishment of cold chain and development of related infrastructure, development and transfer of new technologies and product specific packaging, development of appropriate processable varieties of raw material, bringing about future's trading and equalization funds as well. Establishment of network of institutions and testing laboratories could be aimed at in this period to achieve international standards and make Indian products export-worthy. There is a need to propagate non-polluting, cheap technologies, e.g., irradiation and biotechnology for preservation of food.

One of the key resultants of the Policy is the Food Processing Development Act. The proposed Act envisages a single authority for harmonizing and clarifying the function of each player. The Department of FPI will have the role of development while food safety, distribution and other regulatory functions will continue to be administered under existing legislation. The Act would have a developmental focus rather than regulatory nature of the present enactments. The emphasis will be on development of the FP Sector as a whole, the concept of merit goods and encouragement to industries producing merit goods, equalization fund and future's trading for price stability and the need to take congisance of genetically modified foods and government response to them. The policies and guidelines in FP Sector be they relate to HRD, R & D, taxation or regulations also need to be addressed holistically.

In conclusion, it can be said that while the current level of food processing may reflect the primitive rural marketing structure, improvements in this sector can bring about vast improvements in value addition in agricultural products, creation of new employment, especially in the small towns and rural areas, improvement in the nutritional status of the rural women and the poor and availability of cheaper and better products for the consumers. Worldwide, the food processing industries are considered sunrise industries and have the potential of attracting huge local and foreign investments. These investments will not only accelerate the pace of industrialization ., but will also lead to improvements in both rural and urban infrastructure. A well run food processing industry ensures that while on one hand the producer gets remunerative price for his product, the consumer pays less for higher and assured quality. The price to be paid in the shape of tax holiday may, no doubt, mean a few crores of loss to the exchequer, but that will be more than amply compensated by the additional investment inflows as also by long term gains to the Government's fiscal resources.

It will be no axiom to say that a food processing unit a day will keep poverty and backwardness at bay.

TINPLATE CONTAINERS FOR FOOD

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The earliest record of the preservation of perishable food materials by thermal treatment in hermetically sealed containers is found in the classic work of Spallazani in 1965. During his experimentations in connection with orgin of life, he found that organic infusions could be protected against spoilage by prolonged heating in a well corked bottle. However, Nicolas Appert is considered as the father of the canning industry as he was the first to employ consciously the process of heat treatment and hermetic sealing in the preservation of food, During the Nepoleanic wars, the need for a method of preserving food for Army became so pressing that the French government announced a prize of 12000 francs to anyone, who could device a method of food preservation which would insure wholesome food. Appert came up with the solution after several years of experimentation and in 1804, submitted samples which were found to be acceptable. The prize was awarded to him which aided him in establishing "The House Of Appert", a commercial organisation which continues to exist even to date.

The following decade saw the development of canning industry in England and America and simultaneously several can making companies sprang up. The growing importance of the industry led to the formation of the National Canners Association in America in 1907. In 1913, the research laboratory of the association was established in Washington with branches in Seattle and San Francisco. The work of these laboratories and the research departments of various can manufacturers made the present high quality of canned food at low cost, possible.

More than 400 different varieties of food are preserved by canning and the number is constantly changing. The list includes practically all of the fruits and vegetables grown, a wide variety of meats and meat specialties, sea foods, soups, strained and chopped foods for infant feeding, fruits and vegetable juices and many gourmet products, puddings and sauces. The annual pack of all products runs into several billions of cans. Today, a wide array of packaging materials are available in the market but tinplate container is still the best packaging solution available to the world.

The characteristics of an ideal container for canned food are :

1. Strong enough to protect its contents adequately in shipping.
2. Ease of fabrication into desired sizes.
3. Light for economical handling.
4. Readily opened.
5. Impervious to air and water.
6. Of pleasing and sanitary appearance.
7. Not harmful or toxic to the contents.
8. Capable of being heat sterilized.
9. Inexpensive enough to discard after use.
10. Ease of being hermetically sealed at high speed.
11. Excellent printability and lacquerability.
12. Environmental friendly.

These qualities are very well met by tinplate containers.

Although, the earliest canning was done in glass containers, within a few years, tinplate containers came into wide spread use. For many years, cans were made by hand and were either of the open top, hand soldered style or the hole and cap type. Around 1900, the sanitary can which is sealed mechanically with soldered side seam was developed and today the modern can makers have done away with soldering and developed welded can bodies. The soldered cans had posed the problem of possible lead contamination in the products packed and with the advent of welded cans, this problem was totally obviated.

The ends were provided with a non-toxic process resistant rubber seal and thus there was no need for soldering the ends. The modern cans are made mechanically on a series of machines known as a can line at a rate in excess of 300 cans per minute.

The material from which the can is made consists of a steel base plate coated with tin. Prior to the acute need of tin conservation which was occasioned by the war with Japan, the tin coating was applied by hot dipping method. This method of tinning was eventually found to be uneconomical and not uniform and was replaced by electrolytic tinning process. Considerable economy was thus effected by applying a thinner and uniform coating of tin as also differential coating on either side of the tinplate depending on usage.

Depending on the nature of the product, its electrochemical behavior, type of pigment responsible for its suppurating properties etc, different grades of steel and tin coating weights can be selected to meet different product needs.

In the manufacture of cans from any type of plate, the can sometimes may be enameled on the internal surface in order to protect the food against corrosion or sulphur staining. Various enamels are now available to meet this requirement. Similarly, to protect the can against external corrosion cans are often decorated by printing in attractive designs or lacquered.

Tin cans are no more confined to foods alone; a large number of non food products are also packed in metal cans such as lube oils, greases, paints, pesticides, varnishes, shoe polishes etc to name a few.

Canned Foods in relation to health : The relation of any food to health of the consumers involves two main considerations

a) Nutritive value

b) Toxicological aspect

The canning industry has been concerned with a study of the nutritive value of canned foods practically from the beginning of modern activity in the field of nutrition research by means of animal feeding tests. It has been established that all requirements of an adequate diet could be met by the use of a variety of canned foods. The actual experimentations have been carried out by institutes of Nutrition and Dietetics and their findings based on their continuing programme of basic research have re-emphasized the fact that canned foods in every respect are equal in nutritive vaiue to the same foods cooked in any other way. No other package provides such protection to food stuff as tin containers.

Referring now to the toxicological aspect of cored foods, the experience of the canning industry justifies that tinplate cans do not pose any thereat to health. The metallic salts which may be present in canned food are those which can be acquired from contact of the food product with the food handling machinery and the tin containers. These are almost exclusively tin and Iron. The quantity of these will very somewhat with the food but in all cases in small and without any health significance.

The industry did recognize the possibility of lead contamination from solder which sometimes creeps through the soldered side seam to the interior of the can during fabrication. As mentioned earlier, improvements in can making technology have replaced soldering with welding process and thereby eliminated lead bearing surfaces from the cans completely.

In combating insect pests, various toxic sprays and dusts are commonly used on fruits and vegetables during the growing season. Any spray residue which may still be present at the time of harvesting are usually removed by thorough washing given to the fruit or vegetable during preparation for canning.

Cases of illness due to food borne pathogenic organisms are of much more frequent occurrence than those due to ingestion of food borne toxic chemicals. The micro organisms in foods are destroyed by thermal sterllsation; however, should there be any viable organism present in the can, due to processing inadequacies or defective seaming, the cans will exhibit bulging of ends. The modern Sanitary ends are designed to show up any spoilage

inside the can with the engineered expansion ring feature built into the ends. Bulged cans should be discarded as spoilt.

Fallacies about canned foods: With some products, however, the food is assumed to develop "Ptomaines" or some ill defined toxic principle, unless promptly emptied into another container or vessel. This belief has sometimes been supported by attending physicians in cases of illness presenting classical symptoms of nausia, vomiting and diarrhoea, either because of lack of knowledge or as a convenient diagnosis readily acceptable to the patient. There are some foods, which should be transferred from the tin container after opening, not because of any danger to health. A number of acid products are quite corrosive in the presence of oxygen. If held in an open can these products attack the container and unless used within a few hours may become astringent and the flavour and the colour may be impaired due to iron pick up. Nevertheless, for most canned foods, the can is perhaps the best container for an unused portion of the food because it was at least sterile at the time of opening, while a dish or a pan is likely to serve as a source of bacterial contamination, which will find a suitable environment for growth.

Research and Development Can making technology is making rapid strides continually to keep pace with the developments in the food sector and working out expedients to lower the costs and extending service life of the cans with ever expanding product lines and their exacting requirements and meeting the market needs. In the direction of cost reduction without sacrificing the performance of cans, extensive research has now brought about the development of double reduced tin plate or 2CR plate. The steel plate in 2CR has an average 30-35% gauge reduction with additional strength due to work hardening and sufficient ductility to form the can bodies and ends satisfactorily.

Low tin coated steel (LTS) with a nominal tin coating mass of I.1 gm/m2 has been developed as a substitute for 2.8 gm/m2 tin coated plate. The product has been found to be suitable for carbonated beverages, beer, fruits and juices. LTS has excellent corrosion resistance, good lacquerability/ printability and weldability due to a duplex coating on steel substrate. The material has a very thin layer of free tin on the steel base followed by chromium-chromium oxide protective layer.

As tin has always been a relatively expensive commodity, a most widely used alternative system now is electrolytic chromium/ chromium oxide coated steel called TFS or tin free steel. This material gives good lacquerability and is widely used for making can ends and drawn cans. Welding of TFS is difficult due metallic coating on steel. Unless this is removed along the edges of the metal blank to be welded it poses problems in welding. Different hybrid versions are being tried to overcome the limitations of TFS. TFS cans are being used for non-critical products such as tea and coffee where the cans are side seam cemented with plastic polyamide resin cements. However enameled TFS ends are used for processed food cans satisfactorily.

In the sphere of convenience of handling of cans by consumers, easy open pull-tab devise has been developed which has become very popular in the soft drinks, juices, beer can sector and some processed foods as well.

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